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# A Cross-Sectional Study in Iraq to Know Lipid Profile Outcomes in Children Patients with Down syndrome

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**Abstract: Background:** Down syndrome is a genetic condition brought on by the existence of a third copy of chromosome 2 1 in whole or in part. Even though, it is frequently linked to mild to severe physical growth delays and distinctive facial traits. However, some students in Rome receive their education in regular schools, others need a more specialized education where some people with DS complete their high school education where a small number continue their education after that. **Objective:** This paper aims to conduct a cross-sectional study in Iraq to know the outcomes of lipid profiles in patients with Down syndrome of children. **Patients and Methods:** Data were collected retrospectively through reviews of electronic medical records or electronic hospital records, and discharge data for all Down syndrome patients from different hospitals in Iraq between 3rd Jun 2021 to 7th July 2022, who were children among all patients who underwent procedures. These data were designed with two groups where the first group was represented with Down syndrome patients who have 40 patients while the second group represented control who contain 30. A statistical study was conducted for patients using the SPSS program. **Discussion:** The study includes 40 Down syndrome patients between the ages of 5 and 10 years, with 8.5±2.5 of the control group. Data on the distribution of patients' indicator values in obese 7 (17.5 %) for Down syndrome patients while 6 (20 %) for the control and overweight child ren for Down syndrome patients 15 (37.5 %) while 3 (I0 %) for the control group are presented in this study. As well as this study was found an increase of patients' hypertension 5 (12.5 %) for Down syndrome patients and 3 (10 %) for the control group. Obesity and being overweight do not appear to significantly increase the risk of cardiometabolic disease. Although ApoA-physiological I's anti-atherosclerotic activities are widely known, ApoA-function II's is still not completely understood. According to certain research, elevated ApoA-II reduces reverse cholesterol transport and HDL's antioxidant capacity, which in turn encourages atherosclerosis. **Conclusions:** According to the results of the study, TC, TG, and LDL increased significantly while HDL decreased significantly in DS. The results indicated that children with Down syndrome had unfavorable lipid profiles, particularly an increase in Lp (a) levels, as well as a change in the quality of high-density lipoprotein cholesterol, compared to the control group.

**Keywords:** Down's syndrome; Obesity; Hyperlipidaemia; Hypertension; and QOL

## INTRODUCTION

Down syndrome is a genetic condition caused by the occurrence of a third part of chromosome 21, whether in whole or in part. Although it is often associated with mild or severe physical developmental delays, distinctive facial features [Parker, S.E. *et al*., 2010]. However, Some students are in schools, and others may go to more specialized education as these people have Down syndrome. In French studies, adults with intellectual disabilities account for 20 % for work purposes. Likewise, a 50-year-old has an average intelligence comparable to that of a mature child of 8 or 9 years of age. [Roizen, N.J. *et al*., 2003]

German studies showed that a newborn appears on one in 1000 every year. John Langdon Down is credited with defining and fully describing the disease, which appeared in 1866, but Edouard Seguin and Jean Etienne had previously identified descriptions of the disease before that in 1838 and 1844. [Murray, J. *et al*., 2010]

Also, in 1959, French researchers examined chromosome 21 's extra copy as the genetic cause of Down syndrome. DS is one of the most common reasons of poor growth, occurring about 1 in every 691 live births. An increased incidence of disorders such as thyroid disease, leukemia [Bull, M.J, 2011], congenital cardiac issues, gastrointestinal abnormalities, obesity, and hypertension exists in those who are born with Down syndrome (DS). Despite a greater likelihood of long-term illness, the life expectancy for those with DS has increased and is now close to 60 years. Given the longer life expectancy and elevated risk of diabetes and obesity in those with DS, long-term health, particularly atherosclerotic cardiovascular illness, is a worry. [Magge, S.N. *et al*., 2008; Adelekan, T. *et al*., 2012]

It is considered that patients with Down syndrome are one of the most susceptible to obesity, as well as insulin resistance, as all of these are associated with unfavorable lipid manifestations, which are the most hardening of the arteries, as they contain





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triglycerides in high concentrations, as well as low levels of high-density lipoprotein cholesterol known as (HDL). [Beck, V.D.Y. *et al*., 2021; Bello, C. T. *et al*., 2017]

Moreover, previous studies have compared the lipoprotein and lipoprotein levels of individuals with Down syndrome with those without. [Bertapelli, F. *et al*., 2016; Buonuomo, P.S. *et al*., 2016]

## PATIENTS AND METHODS

Data were collected retrospectively through reviews of electronic medical records or electronic hospital records, and discharge data for all Down syndrome patients' different hospitals in Iraq between 3rd Jun 2021 to 7th July 2022, who children among all patients who underwent procedures. These data were designed with two groups where the first group was represented with Down syndrome patients who have 40 patients while the second group represented control who contain 30. A statistical study was conducted for patients using the SPSS program. This study conducted the demographic results between patients of Down syndrome and control where included age, sex; with a part of males and females, medical history; where contain hyperlipidemia, obesity, overweight, hypertension, thyroid disease, diabetes type 1, and diabetes type 2, and all details in Table 1.

Besides to that, it extended to the distribution of lipid items characteristics between patients of Down syndrome and Control with parameters who have TC (mg/dL), HDL-C (mg/dL), LDL-C (mg/dL), TG (mg/dL), non-HDL-C (mg/dL), ApoA-I (mg/dL), ApoA-II (mg/dL), ApoB (mg/dL), ApoA-I/ApoA-II, ApoB/ApoA-I, Lp (a) (mg/dL), and Lp (a) >30 mg/dL (N) that represented in Table 2. Moreover, this study was determined through distributions of Lipid profile parameters between patients of Down syndrome and Control TC (mg/dL), HDL-C (mg/dL), LDL-C (mg/dL), TC (mg/dL), non-HDL-C (mg/dL), and BMI (kg/m2). According to QOL, this paper focused on the assessment outcomes of the study according to scale quality of life where these variables include physical, emotional, social, and depression which are all details seen in Table 3.

## RESULTS

**Table I:** The demographic results between patients of Down syndrome and control

| Variables | Patients of Down syndrome (40) | Control (30) | P-value |
|---|---|---|---|
| **Age (Mean±SD)** | 7.4±2.4 | 8.5±2.5 | 0.0486 |
| **Sex (N %)** | | | |
| Male | 26 (65 %) | 17 (56.67 %) | 0.0458 |
| Female | 14 (35 %) | 13 (43.33 %) | 0.0362 |
| **Medical history (N %)** | | | |
| Hyperlipidaemia | 3 (7.5 %) | 4 ( 13.33 %) | 0.0421 |
| Obesity | 7 (17.5 %) | 6 (20 %) | 0.0472 |
| Overweight | 15 (37.5 %) | 3 ( 10 %) | 0.0335 |
| Hypertension | 5 (12.5 %) | 3 (10 %) | 0.0484 |
| Thyroid disease | 2 (5 %) | 5 (16.67 %) | 0.0274 |
| Diabetes type 1 | 4 (10 %) | 2 (6.67 %) | 0.0466 |
| Diabetes type 2 | 4 (10 %) | 7 (23.33 %) | 0.0255 |

**Table 2:** Distributions of lipid items characteristics between patients of Down syndrome and Control

| Variables | Patients of Down syndrome (40) | Control (30) | P-value |
|---|---|---|---|
| TC (mg/dL) | 173.7± 33 | 165± 25.5 | 0.0377 |
| High-density lipoprotein cholesterol (mg/dL) | 52 ± 12 | 64 ± 11 | 0.0453 |
| Low-density lipoprotein-cholesterol (mg/d L) | 103 ± 33 | 88 ± 25 | 0.0421 |
| TG (mg/d L) | 80 (55-97) | 68 (50-77) | 0.0433 |
| non-HDL-C (mg/dL) | 16 ± 35 | 105 ± 22 | 0.0326 |
| ApoA-I (mg/dL) | 140 ± 22 | 20 1 ± 32 | 0.0463 |
| ApoA-II (mg/dL) | 31 ± 5 | 35 ± 7 | 0.0487 |
| ApoB (mg/dL) | 69.2 ± 13.1 | 66.4 ± 10.3 | 0.0487 |
| ApoA-I/ApoA-II | 3.25 ± 0.77 | 4.11 ± 0.66 | 0.0493 |





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|---|---|---|---|
| ApoB/ApoA-I | 0.86 ± 0.05 | 0.65 ± 0. 12 | 0.0477 |
| Lp (a) (mg/dL) | 37.2 (21.5-54.3) | 6.8 (2.4- 16.1) | 0.0354 |
| Lp (a) >30 mg/dL (N) | 26.4/57% | 6/ 15 % | 0.0324 |
| BMI (Kg/m2) | 23 (18.8-24.6) | 17.44 (17.3_22.1) | 0.0457 |

**Table 3:** Assessment outcomes of study according to scale quality of life

| Variables | Patients of Down syndrome (40) | Control (30) | P-value |
|---|---|---|---|
| **Physical** | 62 (78.62 ± 16.8) | 82 (86.3 ± 8.5) | 0.0041 |
| **Emotional** | 61 (68.9 ± 2 1.2) | 82 (79.0 ± 15.4) | 0.0312 |
| **Social** | 61 (83 ± 1 4.7) | 82 (87.55± 99.4) | 0.0487 |
| **depression** | 53 (77.9 ± 16.6) | 74 (72.9 ± 19.5) | 0.000 |

## DISCUSSION

The study includes 40 Down syndrome patients between the ages of 5 and 10 years, with 8.5±2.5 of the control group. Data on the distribution of patients' indicator values in obese 7 (17.5 %) for Down syndrome patients while 6 (20 %) for the control and overweight children for Down syndrome patients 15 (37.5 %) while 3 (10 %) for the control group are presented in this study. This study was found an increase of patients' hypertension 5 (12.5 %) for Down syndrome patients and 3 (10 %) for the control group. Obesity and being overweight do not appear to significantly increase the risk of cardiometabolic disease. Although being overweight and obese did not appear to be related to hypertension values in DS, it is known that hypertension is diminished in those with DS, and reference cut-off values for the classification of hypertension may not be used to accurately identify risk for future cardiovascular disease in DS [De Asua, D.R. *et al*., 2014]. According to diabetes type 2, this data shows 4 (10 %) for Down syndrome patients and 7 (23.33 %) for control with a p-value of 0.0255. We demonstrated a higher ApoB/ApoA-I value in the DS group, which is consistent with the variations in LDL-C and HDL C concentrations between the groups that were shown in our study. Even though levels of LDL are typically not increased, some researchers have shown that the ApoB/ApoA-I ratio is the most powerful predictor of the risk of CVD and may be especially helpful in determining its risk in metabolic syndrome [Patterson, D, 2009; Weijennan, M.E. *et al*., 2010]. HDL particles defend against atherosclerosis principally through their capacity to induce cholesterol efflux from lipid-laden macrophages in the arterial wall [Malt, E.A. *et al*., 2013]. HDLs also possess several protective qualities. In our study, we evaluated the concentrations of the primary proteins defining the HDL fraction (ApoA-I and ApoA-II), and we found significantly lower concentrations of ApoA-I, ApoA-II, and the ApoA-I/ApoA-II ratio in children with DS in addition to finding significantly decreased mean levels of HDL C. HDL particles defend against atherosclerosis principally through their capacity to induce cholesterol efflux from lipid-laden macrophages in the arterial wall [Facts About Down Syndrome, 2012]. Although ApoA-physiological l's anti-atherosclerotic activities are widely known, ApoA-function ll's is still not completely understood [Roizen, N.J. *et al*., 2003]. According to certain research, elevated ApoA-II reduces reverse cholesterol transport and HDL's antioxidant capacity, which in turn encourages atherosclerosis. In individual with DS, a lower ApoA-I/ApoA-II ratio suggests that HDL molecules are more enriched in ApoA-II, which may have an impact on particle quality. [Murdoch, J.C. *et al*., 1977]

## CONCLUSION

According to the results of the study, TC, TG, and LDL increased significantly while HDL decreased significantly in DS. The results indicated that children with Down syndrome had unfavorable lipid profiles, particularly an increase in Lp (a) levels, as well as a change in the quality of high-density lipoprotein cholesterol, compared to the control group.

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