IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 1 Ver. VIII (Jan. 2016), PP 66-70
www.iosrjournals.org

Assessment of Lipid Profile Among Restricted Diet Control Autistic Patients

Samah Hussein Moheildin[1], Amar Mohamed Ismail[2*]
[1] *Department of Clinical Chemistry, Faculty of Medical Laboratory Sciences, Al-Neelain University, Sudan*
[2] *Department of Biochemistry and Molecular Biology, Faculty of Science and Technology, Al-Neelain University, Sudan*

Abstract: *The objective of this study was to assess lipid profile among restricted diet control autistic patients in Khartoum Autism spectrum disorders (ASDs) Centers. This was cross-sectional study carried out in 80 control diet autistic patients (4 to 16 years old) compared with 80 controls matched healthy non-autistic subjects. Lipids profile (Cholesterol, triglycerides, LDL-C, HDL-C and LDL/HDL ratio) were measured after overnight fasting blood samples collection. Independent t-test analyses showed cholesterol, HDL and LDL were lower in autistic patients compared to controls with (p-value 0.004, 0.000, 0.009) respectively. In addition triglycerides was higher in autistic patients compared to controls (p-value 0.025), while LDL/HDL ratio was insignificantly difference (p-value 0.516). Persian's correlation showed positive correlation between cholesterol versus HDL-C, LDL-C and LDL/HDL ratio with (p-value 0.000, 0.000 and 0.025) respectively, negative correlations were observed between HDL-C when compared with triglycerides and LDL/HDL ratio (p-value 0.000 and 0.000 respectively, also positive correlation between BMI and triglycerides (p-value 0.020). Our study concludes restriction control diet shows satisfactory results of lipids in autistic subjects, thus contributes to maintain normal lipids and could help to reduce symptoms related to hyperlipidemia.*
Keywords: *Lipids, diet control, autism, neurological disorders*

I. Introduction

Autism spectrum disorders (ASDs) is heterogeneous and neurodevelopment behaviorally (1) which diagnosed in children, young people and adults (2). Caloric restriction has been suggested to exert neuroprotective effects, including improved mitochondrial function, decreased oxidative stress and apoptosis, and inhibition of proinflammatory mediators and it's expected to be use in the treatment of convulsion diseases (3). Patient with autism involves delays impairment in social skills thus level of intellectual functioning is highly variable with the patient of autism (4, 5)

Prevalence of autism is 4-5 per 10,000 which account approximately 1 in 2,000, prevalence increased to 10-20 per 10,000 or one in every 500 to 1,000 in some area (6). The etiology of autism spectrum disorders is unknown but suggests many genes defect may be involved in tandem with environmental factors (7).

The brain has highest percentage of lipids specifically phospholipids and poly unsaturated fatty acid (PUFAs) any decrease in lipid concentration lead to developing brain and involved in pathophysiology of autism spectrum disorder (8) the omega-3 docoshohexaenoic and omega-6 arachidonic acid are PUFAs in brain and in composition of neuronal membranes (9) the arachidonic acid is metabolized by cyclooxygenase and lipoxygenase, lead to formation of prostaglandins and leukotrienes that increase in brain injury and lead to increase blood brain barrier permeability (10), abnormalities of fatty acid metabolism play role in the pathology of various psychiatric disorders such as attention deficit hyperactivity disorder dyslexia, dyspraxia, bipolar disorder and schizophrenia (11). Reaction between PUFAs and ROS lead to lipid peroxides and hydrocarbon, these are highly toxic to the cells (12), atherosclerosis development by increase of lipids peroxidation (13). Chronic neurologic disorder caused by deficient of vital lipids, essential neural lipids component and cholesterol these are involved in normal motor and mental capacity, also cholesterol is important for neuron signaling (14, 16). Smith-Lemli Opitz Syndrome (SLOS) is disorder of the cholesterol metabolism lead to deceased cholesterol levels thus many children with SOLS demonstrate autism associated behaviors (15). Patients with ASDs suggested having low cholesterol levels, HDL, LDL/HDL ratio and high triglycerides levels (16).

II. Materials and Methods

In descriptive cross-sectional study was carried out in hundred and sixty subjects, 80 samples taken from diagnosed control diet autistic patients, age (4 to 16 years old) and 80 apparently health as control group, data were collected using questionnaire. Fasting venipuncture blood specimen (5ML) was collected, samples kept in a test tube at room temperature. Clotted blood sample was centrifuged at 4000 r.p.m and separated, then quickly stored at -20 ^{o}C till used.

2.1 Ethical consideration

The study was approved from ethical committee of Faculty of Medical Laboratory Sciences, Al-Neelain University. All participants were informed by the aims of the study and written inform consent was obtained from all participant parent's.

The estimation of lipid profile was measured by using BTS-310 Biosystem semi auto-analyzer.

2.2 Estimation of Cholesterol and Triglycerides

Brief according to manufactured, triglyceride in the sample originates by mean of the coupled reaction a colored complex (quinonaimina). Cholesterol reacts with cholesterol oxidase/peroxidase by coupled reaction to form colored complex (quinonaimina) then both colored formed were measured at 500 nm against the blank.

2.3 Estimation of HDL-C and LDL-C

Brief according to manufactured 0.2 ml of sample was added into 0.5 ml of phosphotungstate and magnesium ions then tube mixed thoroughly every 2 min for 10 min for precipitation. Then enzymatic cholesterol method was used for estimation. LDL-C was calculated by following formula: LDL= Total cholesterol – triglycerides/5 –HDL Also LDL:HDL was calculated and the result expressed as LDL:HDL ratio.

2.4 Estimation of Body Mix Index (BMI)

BMI of all participants were calculated using the following general formula:

$BMI = Wight/ (length/m)^2$

2.5 Statistical analysis

Statistical analysis was done using SPSS version 16.0. Independent t-test and person's correlation were applied to compare mean concentration of study groups and to observe association between parameters respectively. All *p*-values were considered as statistically significant.

III. Results

Table 1. Frequency of autism among gender

Gender	Frequency	Ratio
Males	64 (80%)	4:1
Females	16 (20%)	

Results expressed as (%) and ratio

Table 2. Mean concentration of study parameters among autism versus control group

Variables	Autistic patients Mean±SD	Control group Mean±SD	*p*-value
Cholesterol	120.1±17.9	133.6± 22.0	0.004
Triglycerides	107.5± 26.8	92.3±32.2	0.025
HDL	43.4±8.28	51.33±8.8	0.000
LDL	55.2±17.2	66.1±19.1	0.009
LDL:HDL	1.46± 0.97	1.34±0.51	0.516
BMI	20.3± 4.32	21.0±3.9	0.420

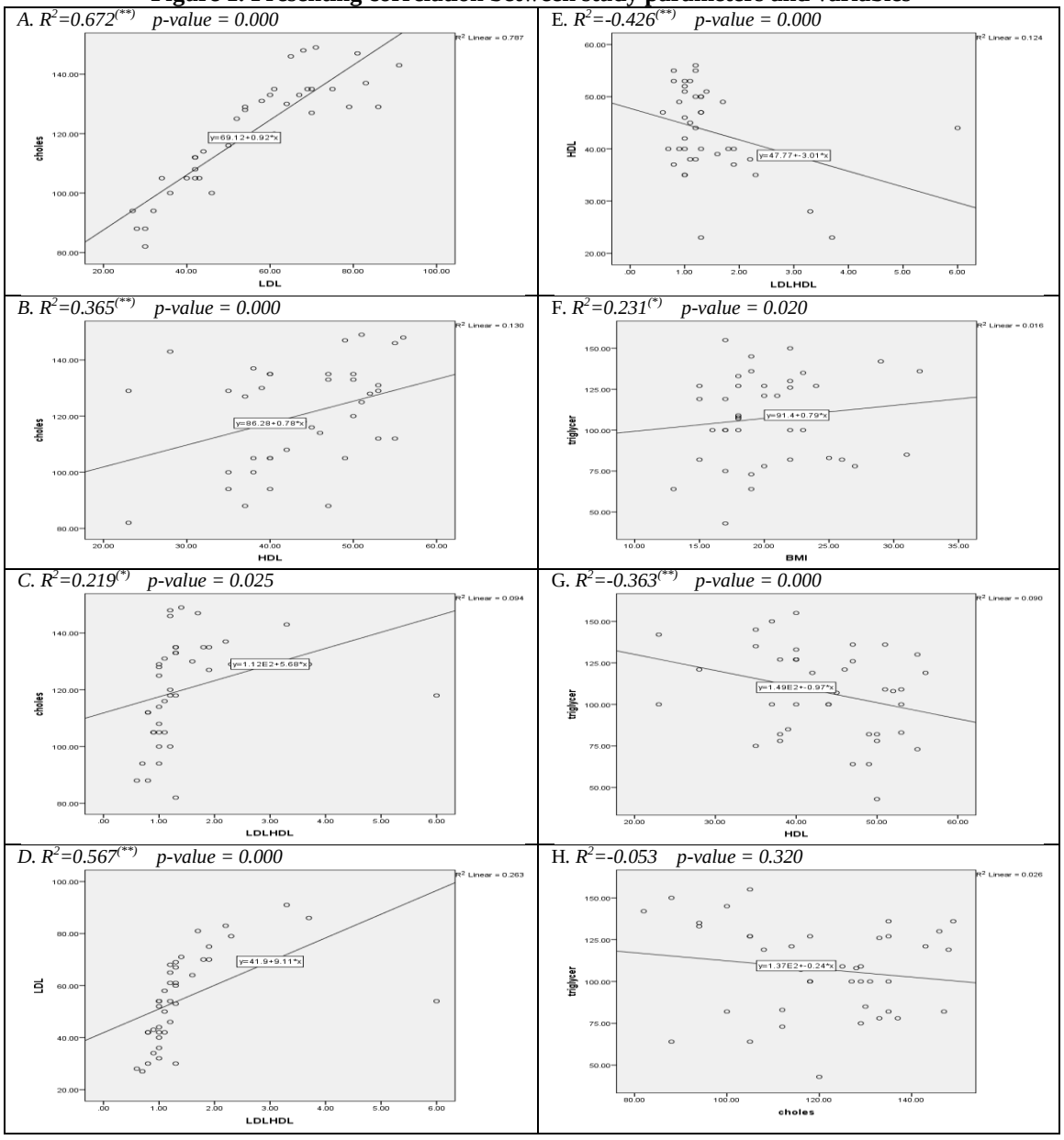
Results expressed as Mean±SD, significant differences considered as p- value ≤0.05

Table 3. Show correlation results between study parameters and variables

Variables	Male Mean±SD	Female Mean±SD	*p*-value
Cholesterol	119.2±17.96	131.6± 16.3	0.253
Triglycerides	107.2± 16.3	111.0±25.51	0.815
HDL	42.8±8.40	50.33±8.60	0.077
LDL	54.9±17.6	59.33±13.4	0.593
LDL:HDL	1.48± 1.00	1.17±0.15	0.576
BMI	20.2± 4.48	21.67±0.58	0.078

Results expressed as Mean±SD, significant differences considered as p- value ≤0.05

Figure 1. Presenting correlation between study parameters and variables



Person's correlation analysis, A. Cholesterol and LDL, B. Cholesterol and HDL, C. Cholesterol and LDL:HDL ratio, D. LDL and LDL:HDL ratio, E. HDL and LDL:HDL ratio, F. Triglycerides and BMI, G. Triglycerides and Triglycerides and HDL, H. Triglycerides and cholesterol. R^2: Indicates positive or negative correlation. *P-value*: indicates strength of correlation.

IV. Discussions

The study aims to evaluate the lipids profile among control diet autism spectrum disorders (ASDs) and its correlation with study variables. The ASDs is impaired social interactions and communication, with restricted interest activates, and behaviors, it is estimated that 12-16% of children have development or behavioral disorders, the autism is more common in male than female (17). The overall ratio of autism in present study shows Sudanese autistic male was 4 fold higher than female.

The results of present study shows conclusive evidence that mean concentration of cholesterol, HDL and LDL in diet control autistic patients were significantly lower in comparison with control group *p*-value (0.004, 0.000, 0.009) respectively. This finding was in agreement that, low cholesterol, HDL and omega-3 fatty acids were observed in autistic patients (18, 19). In fact that deficiency of cholesterol contributes to neural disorders and decrease in HDL has an impact on lipids concentration, thus could lead to developing brain and involved in pathology of autism (8). In addition diet control decrease cholesterol and oxidative stress thus has

neuroprotective effects, accordingly regular screening is recommended to monitor neither increase nor decrease of cholesterol in diet control patients.

Also in the present study significant increase in triglycerides in autistic patients versus control group was observed *p*-value 0.025, while LDL/HDL ratio showed insignificant difference *p*-value 0.516. Previous evidence has shown that autistic patients had increase triglycerides and decrease LDL/HDL ratio (16), in fact that elevated triglycerides is within the reference range, this suggested that triglycerides has no pathogenesis impact in diet control autistic patients.

In the present study there was insignificant difference in BMI of autistic patient when compared to control group *p*-value (0.420). The researchers showed ASDs is associated with both high and low extremes of BMI (20), which was in agreement with our finding and attributed to extremes low and high BMI and also restricted control diet on those group.

Person's correlation revealed positive correlation between cholesterol and (HDL, LDL, and LDL/HDL) ratio *p*-value (0.000, 0.000, 0.025) respectively, also between LDL and LDL/HLD ratio *p*-value 0.000, indicates that, increase of cholesterol and/or higher LDL have positive effect on HDL, LDL and LDL/HDL ratio. In contrast negative correlations were observed between triglycerides and HDL *p*-value 0.000, and between HDL when correlated with LDL/HDL ratio *p*-value 0.000. Our findings are in agreement with that, LDL is responsible for cholesterol delivery to peripheral tissue, while HDL are involved in the inverse transport of cholesterol (21), and negative correlation due to any given fasting triglycerides level can be associated with a lower HDL level and small LDL particles (22).

V. Conclusions

The study concludes that triglycerides is high in diet control autistic patients while LDL, HDL and cholesterol is lower, thus intervention diet control gives satisfactory lipids results and contributes to maintain normal lipids and could help to reduce symptoms in ASDs. Regular screening is recommended to monitor neither increase nor decrease of cholesterol in diet control patients.

Acknowledgements

The author acknowledges sincere thanks to Faculty of medical Laboratory Sciences, Al-Neelain University and Autism Spectrum Disorders Center (ASDC) staff in Khartoum State for the assistance in research work.

References

[1]. Nassim Zecavati, Sarah J .Spence, Neurometabolic disorders and Dysfunction in Autism Spectrum Disorders, Current medicine group LLC, 2009, (9): 129-136
[2]. Christine carson , Caroline Keir , Margret Ghlaimi , Nichole Taske , Jasdeep Hayre , Anna poppa, Autism, The Management And Support Of Children And Young People One The Autistic Spectrum Introduction, National Institute for Health and Car Excellence, 2013, 1-42
[3]. Paoli A, Rubini A, Volek J S and Grimaldi K A, Beyond weight loss: a review of the therapeutic uses of very-low-carbohydrate (ketogenic) diets, European Journal of Clinical Nutrition (2013) (67): 789–796
[4]. James B. Adams, Stephen M. Edelson, Temple Grandin, Bernard Rimland, Advice For Parents of Young Autistic Children, Autistic Research Institute, 2014, 1-13
[5]. Anna jarvinen Pasley, Gregory L. Wallace, Franck Ramus, Francesca Happe, Pamela Lteaton, Enhanced Perceptual Processing Of Speech In autism, Dveleopmental Science 2008, 11(1): 109-121
[6]. Pauline A. filipek, Pasquale J. Accardo, Grace T. Barank, Edwin H. Cook, Jr., Geraldine Dawson, Barry Govdon, Judith S. Gravel ,Chris P. Johnson , Ronnld J kallen, Susan E. Levy, Nancy J minshew, Barvy M. Prizant, Isabelle Rapin, Sally J. Rogers, WendyL. Stone, Stuart Teplin, Roberto F. Tuchman, Fred R. Volkmar, The Screening and Diagnosis of Autistic Spectrum Disorder, Journal of Autism Developmental Disorders, 1999, (29): 439-484
[7]. Austin Mulloy, Russell Lang, Mark O Reilly, Jeff Sigafoos, Giuliolancioni, Mandy Rispoli, Gluten Free Casein diets in the treatment of autism spectrum disorder, A systemic review, Research in autism spectrum disorder, 2009, 1-12
[8]. Christine Wong, Dorota Anna Crawford, lipid Signalling in the Pathology of Autism Spectrum disorders, Spring Science, 2014, 1259-1283
[9]. Sarah A. Brigandi, Hong Shao, Steven Y. Qian, Yipin Shen, Bai-Lin Wu, Jing X. Kang. Autistic Children Exhibit Decreased Levels of Essential Fatty Acid in Red Blood Cells, International Journal of Molecular Sciences, 2015, (16): 10061-10076
[10]. Afaf El-Ansary, Laila Al-Ayadhi, lipid mediators in plasma of autism spectrum disorder, Lipids In Health and Disease, 2012, 1-9
[11]. Javaneh Tamiji, Dorota A. Crawford, the Neurobiology Of lipid Metabolism in Autism Spectrum Disorder, Neurosignals, 2011, 98-112
[12]. Abha Chauhan, Ved Chauhan, W. Ted Brown, Ira Cohen, Oxidative Stress in autism: Increased lipid peroxidation and reduced serum level of ceruloplasmin and transferrin – the antioxidant proteins, Life Sciences, 2004, 2539-2549
[13]. Ondrejovicovab I. Muchova J. Mislanova C. Nagyova Z., Durackova Z., Hypercholesterolemia, Oxidative Stress and Gender Dependence in Children, Prgue Medical Report, 2010; (111): 300-312
[14]. Thomas Tallberg, Jan Dabek, Raija Hallamaa, and Faik Atroshi, Lipidomics, The Function of Vital Lipids in Embryogenesis Preventing Autism Spectrum Disorders, Treating Sterile Inflammatory Diatheses With a Lymphopoietic Central Nervous System Component, Journal of Lipid, 2011; (2011): 1-6
[15]. Atif Zaman, Robert Steiner, Thuan Nguyen, Disordered cholesterol metabolism in autism Spectrum disorders sterol and genetic analyses, Oregon Health and Science University, 2010, 437

[16]. Alisa G. Wood, Izabela Sokolowska, Regina Taurines, Manfred Gerlach , Edward Dudley, Johannes Thome, Costel C. Daria, Potential biomarker in psychiatry, focus on the cholesterol system, Journal of cellular and molecular medicine, 2012; (16): 1184-1195
[17]. Jane W. Ball, Ruth C. Bindler. Developmental and Behavioral Disorders. Pediatric nursing, caring for children, fourth edition, 2008, 1108.
[18]. ALka Aneja, Elaine Tierney, Autism, the role of cholesterol in treatment, International Review of Psychiatry, 2008; 20 (2):165-170
[19]. Identification of protein may lead to future blood test for effective depression treatment, Journal of psychosocial nursing, 2012; (50): 6-7-47
[20]. Nora Kerekes, Armin Tajnia, Paul Lichtenstein, Sebastian Lundstrom, Henrik Anckarsater, Thomas Nilsson, Maria Rastam, Neurodevelopmental problems and extremes in BMI, 2015, 1-17
[21]. Lecis C, Segatto M, Cholesterol homeostasis imbalance and brain functioning: Neurological disorder and behavioral consequences, Journal of Neurology and Neurological disorders, 2014; (1): 1-14
[22]. Robert Boizel, Pierre Yves Benhamou, Bernard Lardy, Ratio of triglycerides to HDL cholesterol is an indicator of LDL particle size in patient with type2 diabetes and normal HDL cholesterol levels, pathophysiology complications, Diabetes care, 2000; (23): 1679-1685