Systematic review investigating the relationship between autism spectrum disorder and metabolic dysfunction

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BACKGROUND

Autism spectrum disorders (ASD)

2% global prevalence[1]

Increased risk for comorbidities: hypertension, obesity, dyslipidemia, cardiovascular disease[2]

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Increased morbidity and mortality[2]

Metabolic dysfunction

Defined as type 2 diabetes mellitus (T2DM) and metabolic syndrome components[3]:

Hyperglycemia (fasting blood glucose ≥100 mg/dL)
Central obesity
Dyslipidemia (triglycerides ≥150 mg/dL (1.7 mmol/L) or high-density lipoprotein (HDL) <40 mg/dL (1.0 mmol/L) in males; <50 mg/dL (1.3 mmol/L) in females)
Hypertension (systolic ≥130 and/or diastolic ≥85 mm Hg)

Few studies have explored metabolic dysfunction in individuals with a diagnosis of ASD. Interventions focusing on these indicators of metabolic dysfunction may help significantly decrease comorbidity in individuals with ASD and prevent serious adverse health events[4].

OBJECTIVE OF REVIEW

The objective of this systematic review is to examine metabolic dysfunction, specifically metabolic syndrome and its components, as well as T2DM as it relates to individuals with a diagnosis of ASD.

METHODS

Search Term Categories
Population (autis* OR asperger* OR pervasive developmental disorder OR PDD OR ASD)
Outcome (metabolic OR obesity OR diabetes OR hyperglycemia OR hypertension OR hyperlipidemia OR dyslipidemia)

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Electronic Database Search
Pubmed, Scopus, Embase, Cochrane, PsychInfo

→

Screening
1. Title, abstract, and keyword screening
2. Full text screening
3. Add additional papers from other sources

→

Data Extraction
a) Study characteristics
b) Participant characteristics
c) Metabolic dysfunction related outcomes of interest
d) Controlling factors, mediators, moderators.
e) Limitations of study

RESULTS

3,570 unique references from search

→

207 full texts to screen
+
1 paper from other sources

→

8 included papers

Table 1: Summary of Metabolic Dysfunction Component Results with Covariates and Secondary Analyses

Metabolic Dysfunction Component	Main Analysis (ASD vs control)	Covariates	Secondary Analyses			
			Age	Sex	Atypical Anti-psychotics	Other
T2DM/ hyperglycemia	Higher incidence, shorter time to onset, higher odds	Demographics, atypical antipsychotics, medical comorbidities, age, sex, BMI	Both adolescents and young adults have increased risk	Both sexes have higher risk than control. Male risk factors-obesity and dyslipidemia, female-hypertension and dyslipidemia. Females have increased odds vs males.	Both short term and long-term use increase risk	HTN, obesity, dyslipidemia increase risk. Greater RR of being prescribed medication to treat comorbid condition.
Hypertension	Higher rate, higher odds No difference for SBP/DBP	Age, sex	-	Only males have increased odds	-	Greater RR of being prescribed medication to treat comorbid condition.
Dyslipidemia	Higher rate, higher odds. Higher t-chol, lower HDL, higher LDL, higher TG	Age, sex, BMI, SES, BMI, social anxiety, obsessive compulsive behavior, physical activity, antipsychotic medications, smoking	-	Both sexes have increased odds versus controls. Females have increased odds compared to males.	No effect on lipid profile	Controlling for physical activity did not remove significance for total cholesterol or LDL. Interaction between TG and ASD for predicting HDL. Greater RR of being prescribed medication to treat comorbid condition.
Central obesity	-	-	-	-	-	-

ASD=autism spectrum disorder, T2DM=type 2 diabetes mellitus, HTN=hypertension, T-chol=total cholesterol, LDL=low density lipoprotein, HDL=high density lipoprotein, TG=triglycerides, RR=relative risk, SBP=systolic blood pressure, DBP=diastolic blood pressure, BMI=body mass index

DISCUSSION

Summary of Results

- **Increased prevalence of T2DM and metabolic syndrome components** associated with ASD, specifically hyperglycemia, hypertension, and dyslipidemia, in pediatric and adult populations.
- **Potential moderating factors** included age, sex, atypical antipsychotic usage, and comorbid medical illnesses.
  - Lack of research investigating the effects of race and ethnicity on these relationships.
- Unknown relationship between ASD and metabolic syndrome as a diagnosis.
- Unknown relationship between ASD and central obesity.

Clinical Implications

- Improve metabolic monitoring in patients with ASD taking antipsychotic medications.
- Increase multidisciplinary collaboration with psychiatry and primary care for monitoring and data gathering.

CONCLUSION

- Those with ASD have increased rates of metabolic dysfunction.
- Further understanding of associations can provide strategies in identifying at risk patients with ASD and improve diagnosis or treatment of comorbidities for optimal patient care.
- Improving metabolic monitoring in patients with ASD may be a strategy to address increased rates or metabolic dysfunction.

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