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**Protein network analysis on the association of PCOS and other diseases towards unraveling its molecular mechanism**

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**ABSTRACT**

This study aims to infer the associations between polycystic ovarian syndrome (PCOS) and other diseases in a proof of concept approach that could be used to develop a procedure to unravel the molecular basis of PCOS that still remain unknown despite its prevalence. PCOS is one of the major causes in female infertility. Women diagnosed with PCOS exhibit various symptoms associate with certain diseases such as diabetes, CVD, ovarian cancer amongst others. Our previous studies on protein-protein interactions (PPIs) provide enormous amount of information that can be used to infer the association between PCOS and other diseases. Association was described as "shared PPIs between PCOS-proteins and proteins related to other diseases" and was calculated using Jaccard Index Similarity. Our analysis has predicted several diseases such as schizophrenia, breast neoplasms and prostatic (Skein's gland) neoplasms to be highly associated diseases to PCOS in accordance to the morbidity studies for the first two. Our approach has shown its ability in identifying new association at the molecular level. Based on the enrichment analyses using ClueGO, PCOS-schizophrenia association was identified based on the link between the estrogen signaling and dopaminergic synapse pathways; PCOS-breast neoplasm association was detected through insulin signaling and ErbB signaling pathways and PCOS-prostatic neoplasms association was detected via FoxO signaling and prostate pathways. The predicted associations were also supported by diseases symptoms analysis. Detailed understanding on the molecular mechanism of PCOS and its association with other diseases will be very useful in improving diagnosis and treatment of PCOS.