Sedentarism, overweight and gut microbiota: increased risk of type II diabetes mellitus in women with polycystic ovaries

RESUMO
Objetivo: Avaliar a influência do sedentarismo e sobrepeso na precocidade do Diabetes mellitus tipo 2 (DM II) em mulheres com Síndrome de Ovario Poliquístico (SOP). Método: estudo piloto observacional, de análise documental e entrevistas desenvolvido via plataforma GoogleForms® com 42 mulheres com SOP com idade entre 21 e 45 anos, com e sem diagnóstico de DM II. Resultados: 42 mulheres fizeram parte do estudo, sendo 23 diabéticas e 19 não diabéticas. Mulheres que gastam mais tempo em frente à televisão, ou usando o celular podem chegar a elevar o risco de obesidade em até 23% e de Diabetes mellitus 2 em mulheres com Síndrome do ovário poliquístico em até 14%. Conclusão: a prática da atividade física não demonstrou ser suficiente para reduzir o IMC, sendo o sobrepeso uma característica comum nas mulheres com SOP sem DM e com DM II. Desta forma controle de peso precisam ser melhor esclarecidas ao grupo.

DESCRITORES: Síndrome do Ovário Poliquístico; Diabetes; Sobrepeso.

ABSTRACT
Objective: To evaluate the influence of a sedentary lifestyle and overweight on the precocity of Type 2 Diabetes mellitus (DM II) in women with Polycystic Ovary Syndrome (PCOS). Method: observational pilot study, document analysis and interviews developed via the GoogleForms® platform with 42 women with PCOS aged between 21 and 45 years, with and without a diagnosis of DM II. Results: 42 women took part in the study, 23 diabetics and 19 non-diabetics. Women who spend more time in front of the television or using their cell phones can increase the risk of obesity by up to 23% and of Diabetes mellitus 2 in women with Polycystic Ovary Syndrome by up to 14%. Conclusion: the practice of physical activity has not been shown to be sufficient to reduce BMI, with overweight being a common characteristic in women with PCOS without DM and with DM II. Therefore, weight control needs to be better explained to the group.

DESCRIPTORS: Polycystic Ovary Syndrome; Diabetes; Overweight.

RESUMEN
Objetivo: Evaluar la influencia del sedentarismo y el sobrepeso en la precocidad de la Diabetes mellitus tipo 2 (DM II) en mujeres con Síndrome de Ovario Poliquístico (SOP). Método: estudio piloto observacional, análisis documental y entrevistas desarrolladas a través de la plataforma GoogleForms® con 42 mujeres con SOP de entre 21 y 45 años, con y sin diagnóstico de DM II. Resultados: Participaron en el estudio 42 mujeres, 23 diabéticas y 19 no diabéticas. Las mujeres que pasan más tiempo delante de la televisión o usando el móvil pueden aumentar el riesgo de obesidad hasta un 23% y de Diabetes mellitus 2 en mujeres con Síndrome de Ovarios Poliquísticos hasta un 14%. Conclusión: la práctica de actividad física no ha demostrado ser suficiente para reducir el IMC, siendo el sobrepeso una característica común en mujeres con SOP sin DM y con DM II. Por lo tanto, el control del peso necesita ser mejor explicado al grupo.

DESCRIPTORES: Síndrome de ovario poliquístico; Diabetes; Sobrepeso.
INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a clinical condition whose etiology is multifactorial, having genetic origins and possible environmental conditions; including today exposure to Endocrine Disrupters (ED). The main clinical manifestations include the presence of acne, hirsutism, alopecia, in addition to menstrual changes and infertility. There is also a greater predisposition to developing diseases such as Diabetes Mellitus (DM II), in which modifiable risk factors (MRFs) such as excess weight and sedentary lifestyle add to an even greater chance of risk of DM II, especially in an “early” form (before an expected average age of 40 years).

It is known that this syndrome is common in menopausal women, and that its prevalence is estimated at 105 million women worldwide. Guidelines based on multi-year evidence developed by the European Society of Human Reproduction and Embryology (ESHRE) and the American Society of Reproductive Medicine (ASRM), and endorsed by more than 40 international societies involved in PCOS have defined this clinical condition as being a set manifestations such as: [1] oligo-ovulation and/or anovulation, [2] hyperandrogenism and [3] the presence of polycystic ovaries.

In most cases, the clinical management of PCOS aims to control hyperandrogenism - resulting from the conversion of excess progesterone into testosterone - and normalize ovulatory cycles. However, a characteristic of PCOS is the presence of insulin resistance (IR) in some women; being a strong facilitator for the early development of DM II. Here it is emphasized that “early” DM II would be that acquired before the age of 40; an expected average age for the development of DM II among women predisposed to this disease and who do not deal with prevention through the management of modifiable risk factors (MRF). These factors include obesity and the adoption of sedentary practices, which can be reversed through changes in habits, especially physical activity.

Therefore, this work aims to investigate the following questions: Does practicing any physical activity help control weight in women with PCOS, in order to avoid the “precociousness” of DM II? This study intends to have an initial view on the issue to guide more in-depth studies in the future, in addition to theoretically discussing the issues involved in the problem raised.

METHOD

This study was carried out in an exploratory manner, as a pilot for subsequent studies. It was carried out through an online survey carried out among women diagnosed with PCOS, participants in the group “Convive – Polycystic Ovary Syndrome” on the social network Facebook, which has more than 2 thousand women with this condition and is attended by health professionals who provide information about PCOS. The survey took place via the GoogleForms platform, between May and June 2020. It was developed with the consent and agreement of the moderators of that group, who presented the research to the community members.

Based on a survey with several questions regarding the presence of risk factors for DM II, such as overweight, diet and sedentary lifestyle in groups of women with diabetic and non-diabetic PCOS, for comparison purposes. This was an observational study, involving documentary analysis and interviews. The data and information collected corresponded to: [a] Patient characteristics: age, family history, general habits; [b] General aspects: Following
The population then corresponded to women who reported having been diagnosed with PCOS, and who expressed whether or not they had DM II. Women who did not meet these conditions, who did not agree to participate in the research or who completed the questionnaire incompletely were excluded from the research. The sample used was the convenience sample according to Miot,7 seeking to reach a total of 40 women (Figure 1).

With regard to physical activity, the practice or not was only questioned according to the interviewee’s understanding, as a way of evaluating her understanding of the topic. The data were expressed in graphic form for subsequent analysis and discussion of the results found.

As it involves human beings, the legislation in force in Brazil was respected, and this project was submitted to the Research Ethics Committee (CEP - Comitê de Ética em Pesquisa) of UNIVILLE, being assessed and evaluated as approved, obtaining an approval protocol with CAA registration 26897719.0.0000.5366.

RESULTS

A total of 42 women took part in the investigation, 23 diabetics and 19 non-diabetics. Diabetics accounted for a total of 53.7% (Figure 2).

The average age of the diabetes group was 35 years, with the most frequent reported age of being diagnosed with diabetes being 30 years, an age considered early for the development of diabetes, highlighting the influence of PCOS on this condition, as on average it is expected to manifest around 40 years of age8 (Figure 3).

The fact that there is an average age of diagnosis of around 30 years for DM II among women with PCOS deserves to be highlighted, given the condition in which the average age for developing such a clinical condition is approximately 40 years.9 It is true that the fact that they have PCOS affects the condition regarding Insulin Resistance (IR); which in itself becomes a warning.9 Furthermore, women with PCOS have a 3.26 times chance of having impaired glucose tolerance. Studies also indicate that up to 2.87 people have DM II compared to women who do not have PCOS.9 These facts draw even more attention to the importance of encouraging weight control and not being

Figure 1: Research process, which included a virtualized questionnaire made available to groups of women with PCOS via digital media. Of the total respondents, those diagnosed with DM and those without DM were separated, 2020

Source: data from authors, 2020

Figure 2: Process of choosing participants. Goal was to reach at least 40 women (Miot convenience sample), 2022

Source: data from authors, 2020
sedentary among women with PCOS. Therefore, physical activity becomes an important condition as it can be extremely useful in preventing obesity and the increased risk of DM II.

DISCUSSION

Physical activity versus sedentary lifestyle in women with PCOS

When asked about physical activity, women with PCOS and DM II (corresponding to the total of 23 women in the final sample), 16 women declared themselves sedentary, while 7 stated that they performed physical activities weekly (Figure 4). Regarding the Body Mass Index (BMI), 70% of women who declared themselves to be sedentary had an average BMI value of 34.9. The group that declared performing physical activity had a BMI of 33.8 (Figure 4). There was no absolute difference in BMIs between the groups.

Even though the exploratory sample does not allow us to conclude that the practice of physical activity has an influence or not on BMI, reports on the important role of this habit in preventing DM II in women with PCOS must be considered in the literature. Practicing aerobic activity contributes positively to preventing the occurrence of pre-diabetic events, such as reducing insulin resistance (IR). Authors also claim reduced glucose tolerance; which would also imply the prevention of DM II. The practice of physical activity would influence the metabolization of fatty acids, which in turn favors the translocation of GLUT5 due to their adequate phosphorylation in the serine portion; allowing its translocation aiming at glucose uptake.

Observing the data found in figure 4...
Avoiding the “precociousness” of DM II, the discussion also begins to involve the issue of the limits of physical activity to control weight and reverse IR, and the competition of other factors predisposing to excess weight that need to be worked on together.

Therefore, even though it is understood that physical activity is positive for weight reduction, it is necessary to discuss the influence of other factors that contribute to weight gain, and which are also subject to change (thus being MRF). This discussion becomes important since the adoption of a more reductionist thinking can lead to insistence on certain guidelines – from professionals or found in social media - which would be limiting in its intended purpose: weight reduction and prevention of DM II. It is essential to know other ways that contribute to weight gain that can be managed together with physical activity, always with scientific support.

In the difficulty of weight control through physical activity: The intestinal microbiota of women with PCOS and its influence on weight, and how to overcome this problem: perspective within science

In an analysis of the microbiota present in the intestine of a healthy woman, Bacteroides, Prevotella, Porphyromonas, Clostridium and Eubacterium are found, being Lactobacilli and Bifidobacterium the main beneficial bacteria, which under normal conditions maintain a dynamic balance. Meanwhile, in the intestine of women with PCOS, the microbiota shows reduced alpha dysbiosis and increased beta dysbiosis, with an increase in pro-inflammatory Bacteroides and a decrease in Prevotella, and also bacteria from the lactobacilli and bifidobacteria families, this IM alpha dysbiosis contributes to low-grade chronic inflammation, which may be a driver for the development of inflammatory diseases (Figure 5).

The effects of using probiotics have already been analyzed in 3 aspects: Weight loss, glycemic reduction and lipid profile control in women with PCOS. A double-blind randomized clinical trial with 60 women, in which 30 of them received a capsule of Lactobacillus acidophilus, Lactobacillus casei, etc.
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**REFERENCES**


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**CONCLUSION**

The study showed – in a small convenience sample – that women with PCOS developed DM II at an age around 11 years earlier than expected, being a trend in this group. Regarding the theme of the article, the declaration of physical activity did not prove to be sufficient to reduce BMI, and overweight is a common characteristic in women with PCOS and DM II. Given this scenario, forms of weight control need to be better explained to the group, regarding the practice of physical activities, and that hormonal changes should not be disregarded. Attention to eating habits also needs to be considered, and the use of probiotics may be a promising condition, requiring further studies at the moment.

This study has limitations regarding sampling, indicating trends rather than evidence. Not only sedentary lifestyle but other factors together contribute to excess weight and risk of early DM II. New studies including eating habits and adoption of probiotics will be carried out in larger samples.