Application of WeChat Public Account in Lifestyle Management of Polycystic Ovary Syndrome: a Cross-sectional Study

Fang-Fang Zhang  
Zhejiang University School of Medicine Women's Hospital

Fan Qu (✉ syqufan@zju.edu.cn)  
Zhejiang University School of Medicine Women's Hospital  https://orcid.org/0000-0003-1851-1514

Research

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Abstract

Background

Lifestyle management has been proved to improve both metabolic and reproductive outcomes for women with polycystic ovary syndrome (PCOS). In China, WeChat has become the most popular social media platform. Previous studies have confirmed the effectiveness of WeChat in health intervention and its potential to improve health behaviours. Therefore the present study tried to investigate the efficacy of online education through WeChat public account on the lifestyle interventions of women with PCOS.

Methods

We set up a cross-sectional study between January 2020 and July 2020. Data were collected through online questionnaires. All participants completed a questionnaire, including age, educational level, WeChat activeness, physical exercise, dietary habits, self-reported symptoms and medical history.

Results

A total of 258 women were included in this study, including 96 women with PCOS (PCOS group) and 162 women without PCOS (control group). Among them, 130 women followed our WeChat public account (follower group) and 128 women did not follow the WeChat public account (non-follower group). There were no significant differences in terms of physical activity assessment and dietary assessment between the PCOS and control groups (P>0.05), neither between the followers and non-follower groups (P>0.05).

Conclusions

Application of WeChat public account seems useless in lifestyle management for women with PCOS, however, the conclusion might be limited by the small sample size.

Background

Polycystic ovary syndrome (PCOS) is the most common endocrine and metabolic disorder, ranging from 5–10% among reproductive-aged women [1], with chronic anovulation, hyperandrogenaemia and insulin resistance. It is a complex heterogeneous disorder, mainly affecting women's reproduction, metabolism and psychology, which also increases the risk of endometrial cancer and cardiovascular disease [2, 3]. Women with PCOS are commonly overweight or obese and obesity may exacerbate metabolic and reproductive abnormalities in women with PCOS. Obesity has been shown to impair fecundity through affecting ovulation, endometrial development and implantation [4], aggravate insulin resistance (IR) and hyperandrogenism [5], jeopardize treatment outcomes [6]. And 5–10% weight loss can benefit overweight women with PCOS [7]. Consequently, weight management is recommended as a fundamental treatment strategy, preferably through diet and exercise.
Aerobic exercise has been proved to improve cardiorespiratory fitness, cardiometabolic status and health-related quality of life (HRQL) in overweight/obese women with PCOS [8]. Formerly, a high quality meta-analysis reported that a combination of reduced calorie diets and exercise interventions led to higher pregnancy rates [9]. Lifestyle management is the first-line treatment for most women with PCOS [7].

Copp T et al. reported that a new PCOS diagnosis was helpless to change eating habits and physical activity of women with PCOS [10]. People generally lack reliable way to acquire accurate knowledge about the recommended lifestyle management. In China, WeChat has become the most widely used social media platform, which is closely connected with the daily life of the public [11]. The new model of obtaining health information through WeChat public account has been recognized [12, 13], and the huge potential of WeChat in health intervention needs to be developed. A previous study has attempted to evaluate the effectiveness of WeChat public account as an intervention on weight loss and it was proved to be effective for males [12]. Therefore, we provided the comprehensive knowledge of lifestyle management, including diets and exercise, through WeChat public account to facilitate intelligent decision-making.

A prior study has found women with PCOS failed to reach the ideal target of dietary intakes and physical activities [14]. And no significant differences were found between women with and without PCOS in dietary and physical activity behaviors [15]. The present study was to explore the effects of online education via WeChat public account on lifestyle interventions among women with PCOS.

**Materials And Methods**

**Study design and participants**

The eligibility criteria of participants included (a) women aged over 18 years but no more than 45 years; (b) women who could complete the questionnaire voluntarily. Exclusion criteria included (a) women who failed to provide self-reported symptoms and PCOS related medical history; (b) invalid questionnaires. A questionnaire with more than 3 missing items was considered as invalid questionnaire. We designed a questionnaire on diet and exercise assessment, and collected data in the form of online questionnaires. Prior to distribution, the questionnaire was sent to gynecologists, women with PCOS and general women to examine its validity and consistency.

Data for this online observational cross-sectional study was collected between January 2020 and July 2020. Participants were recruited through Tencent Cloud servers, mainly through WeChat social media pages. All participants completed a general questionnaire, including age, educational level, WeChat activeness, physical exercise, dietary habits, self-reported symptoms and medical history. Women with PCOS were considered as PCOS group and those without medical history of PCOS were considered as control group. Women who followed the WeChat public account were considered as follower group and those who did not follow the WeChat public account were considered as non-follower group.
The study was approved by the Ethics Committee of Women's Hospital, School of Medicine, Zhejiang University, Hangzhou, China, conformed with the Helsinki Declaration of 1975, as revised in 2008 (5) concerning Human and Animal Rights.

**WeChat public account and assessment design**

**WeChat public account**

A WeChat public account, “Fan says women's health”, was used to deliver women health education messages. Since November 12, 2018, the WeChat public account officially sent the first message, a total of 172 messages were sent (two messages every week, on average).

**Diagnosis of PCOS**

According to the Rotterdam European Society for Human Reproduction and Embryology (ESHRE) criteria, a standardized definition of PCOS is based on the presence of at least two of three manifestations: (i) oligo- or anovulation; (ii) clinical and/or biochemical signs of hyperandrogenism; (iii) polycystic ovarian morphology. And excluded other causes of high androgens, including congenital adrenal hyperplasia, cushing's syndrome and androgen-secreting tumors[16].

**WeChat Activity**

To assess WeChat activeness, we set up 3 items based on whether follow the WeChat public account, the length of being a follower and frequency of reading WeChat public account messages.

**Dietary Assessment**

The dietary assessment was comprised of 8 items, mainly assess (i) the inclination to use miscellaneous grains, vegetable oil, white meat; (ii) ingestion of fruits, vegetable, sweets, soy products; (iii) frequency of eating after dinner. Most items were formatted as single selection items, rated on four levels according to intake frequency, including more than 4 times a week, 2–3 times a week, once a week, and basically not [17].

**Physical Activity Assessment**

The physical activity assessment was composed of 5 items, mainly assess the amount of exercise, including the length of time on sedentary, housework, aerobic exercise, anaerobic exercise and steps. The majority of items are graded according to duration [18].

**Statistical analysis**

Statistical analysis was performed using SPSS Version 23.0 (IBM SPSS Inc., Chicago, IL, U.S.A.). Descriptive statistics were used to profile WeChat activity, physical activity assessment, dietary assessment information of all study subjects. Some missing values in the questionnaire are filled in by SPSS. The results for categorical variables are shown as the number of cases per category and frequency
of responses. For the comparisons of categorical data, we used the chi-squared test. For all analyses, two-sided $P$-values of $< 0.05$ was considered statistically significant.

**Results**

1. Participant characteristics, WeChat activity, physical activity and dietary assessment of women with PCOS and controls

We collected 289 questionnaires in total. Twenty-two invalid questionnaires and 9 questionnaires aged over 45 years old, a total of 258 women were included in this study, including 96 women with PCOS and 162 control women. Among them, 130 women followed our WeChat public account and 128 women did not.

As shown in Table 1, women with PCOS had a significant lower educational level ($P = 0.048$) and a higher chance of following our WeChat public account ($P = 0.000$). In terms of the length of being a follower and frequency of reading WeChat public account messages, women with PCOS were still significantly higher than control women ($P = 0.000$) ($P = 0.000$). However, no significant differences existed between the PCOS and control groups with regard to sedentary time each day, housework time each week, steps each day, aerobic exercise time and anaerobic exercise time each day, the habit of eating miscellaneous grains, vegetable oil, white meat, fruits, vegetable, sweets, soy products, and frequency of eating after dinner ($P > 0.05$).

2. Participant characteristics, physical activity and dietary assessment between followers and non-followers among women with PCOS

As shown in Table 2, among the women with PCOS, no significant differences existed between the followers and non-follower groups with regard to sedentary time each day, housework time each week, steps each day, aerobic exercise time and anaerobic exercise time each day, the habit of eating miscellaneous grains, vegetable oil, white meat, fruits, vegetable, sweets, soy products, and frequency of eating after dinner ($P > 0.05$).

3. Participant characteristics, physical activity and dietary assessment between women with PCOS and controls among followers

As shown in Table 3, among followers, women with PCOS had a significant younger age ($P = 0.001$). However, the control women had significant higher levels of steps and aerobic exercise each day ($P = 0.009, 0.040$). There were no significant differences between the PCOS and control groups among followers with regard to sedentary time each day, housework time each week, anaerobic exercise time each day, the habit of eating miscellaneous grains, vegetable oil, white meat, fruits, vegetable, sweets, soy products, and frequency of eating after dinner ($P > 0.05$).

4. Participant characteristics, physical activity and dietary assessment between women with PCOS and controls among non-followers
As shown in Table 4, among non-followers, the control women had a significant higher frequency of eating sweets ($P = 0.001$). There were no significant differences existed between the PCOS and control groups among non-followers with regard to age, educational level, sedentary time each day, housework time each week, steps each day, aerobic exercise time and anaerobic exercise time each day, the habit of eating miscellaneous grains, vegetable oil, white meat, fruits, vegetable, soy products, and frequency of eating after dinner ($P > 0.05$).

**Discussion**

Although the effectiveness of lifestyle management for PCOS has been confirmed [7, 19], this universal and simple treatment method lacks a reliable popularization method [20, 21]. We used the popular method, WeChat public account, which is widely accepted by the public, to provide a professional and reliable platform for women with PCOS to acquire the relevant knowledge of lifestyle interventions. In our study, women with PCOS had a significant lower educational level and higher WeChat activeness to our WeChat public account. However, we observed no significant differences between the PCOS and control groups in terms of physical activity assessment and dietary assessment. It is consistent with former studies that similar dietary and physical activity behaviors were found between women with and without PCOS [15, 22, 23]. However, our research is more inclined to evaluate the diet and exercise habits of women with PCOS. Amirjani S et al. found that the average energy and fat intakes were significant higher and the average scores of physical activity, weight and nutrition control, psychological health were significant lower in women with PCOS [24]. High androgen levels may account for this difference, which may stimulate appetite [25]. Nevertheless, we did not classify the women with PCOS included in the study into different phenotypes, and the effects of androgens cannot be ruled out. Additionally, educational level and WeChat activeness may affect diet and exercise habits. It was further confirmed that no significant differences were found between the PCOS and control groups among non-followers in the majority results of physical activity and dietary assessment, except for frequency of eating sweets. Similar results were also observed between women with PCOS and controls among followers in terms of physical activity and dietary assessment. However, among followers, control women had a significant higher level of steps and aerobic exercise each day, with a significant older age. Similar to this finding, a prior study found that older adults were more inclined to choose slower paced physical activity compared with younger adults [26]. Thus these differences were more likely to be due to the age.

Our WeChat public account provides information about lifestyle management for subscribers, which may improve their knowledge, habits and practices. Among women with PCOS, we found that there were no significant differences with regard to physical activity and dietary assessment outcomes between the followers and non-follower groups. A previous study has also applied WeChat app in lifestyle intervention among 110 undergraduates from Zhejiang University and found significant improvements of dietary habits and physical activity level after a 21-day social media-based intervention [27]. Compared with this research, the immediate effect of short-term intensive information output may be more significant. Our WeChat public account emphasizes long-term penetration, which may lead to imperceptible influence on behavior, but it may not be obvious in the short term. A previous study has confirmed that nutrition
knowledge was relevant to the consumption of specific food types to a limited degree [28], and transition from knowledge to action will take time. Additionally, a lack of feedback or interaction may weaken the expected behavioral changes.

The reason why we failed to find significant differences in physical activity and dietary assessment results between followers and non-follower groups among women with PCOS may due to the following aspects. The small sample size may lead to some bias and deviation. Besides, our questionnaire design was more subjective and did not use quantitative indicators, such as the specific calorie intake and energy expenditure. In addition, we lack objective indicators in evaluation WeChat activity and output efficiency of the message. A previous study has used WeChat cumulative scores related to the interaction with the WeChat public account to evaluate WeChat activeness [12]. Moreover, the development of personal diet and exercise habits is a long process and is easily disturbed by the surrounding environment. It is also important to improve the form of WeChat messages. We used to output mainly via articles. The development of cartoons or videos about lifestyle interventions may provide better information output.

Our study had some strengths. We conducted online education through WeChat public account in the early stage. This is not the first attempt of WeChat public account in disease management, but as we know, this is the first study to apply WeChat public account in lifestyle management for women with PCOS. We are trying to explore a new management model to help women with PCOS maintain healthy lifestyle habits and lose weight, thereby improving their metabolic and reproductive outcomes.

**Future direction**

Lifestyle management through WeChat or other mobile apps may become the future direction. Due to the popularity of app, it is possible to record daily diet or exercise through app. And the app can also provide timely feedback based on the collected data of diet and exercise to achieve good interaction, thereby improving efficiency. With the diversification of human-computer interaction, our online education can be more than text, such as animation, comics, or video.

**Conclusions**

In conclusion, we found no significant differences in physical activity assessment and dietary assessment between the PCOS and control groups, neither between the followers and non-follower groups. Application of WeChat public account seems useless in lifestyle management for women with PCOS, however, the conclusion might be limited by the small sample size. The present study suggested that application of WeChat or other mobile apps, with timely feedback and various forms, may be beneficial in lifestyle management for women with PCOS.

**Abbreviations**

PCOS: Polycystic ovary syndrome
IR: Insulin resistance
HRQL: Health-related quality of life
ESHRE: European Society for Human Reproduction and Embryology

**Declarations**

**Ethics approval and consent to participate**

The study was approved by the Ethics Committee of Women’s Hospital, School of Medicine, Zhejiang University, Hangzhou, China, and the committee’s reference number is IRB-20200271-R, conformed with the Helsinki Declaration of 1975, as revised in 2008 (5) concerning Human and Animal Rights.

**Consent for publication**

Written informed consent was not required because the online questionnaires survey was anonymous and had less than minimal risk. All participants agreed to participate in the study.

**Availability of data and materials**

Not applicable

**Competing interests**

The authors declare that they have no competing interests

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**Authors’ contributions**

FF ZHANG: protocol development, data collection and management, data analysis, manuscript writing/editing. F QU: protocol development, data collection and management, data analysis, manuscript writing/editing.

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**References**
1. Li R, Zhang Q, Yang D, Li S, Lu S, Wu X, Wei Z, Song X, Wang X, Fu S, Lin J, Zhu Y, Jiang Y, Feng HL, Qiao J. Prevalence of polycystic ovary syndrome in women in China: a large community-based study. Hum Reprod. 2013; 28 (9):2562-9.

2. Azziz R, Carmina E, Chen Z, Dunaif A, Laven JS, Legro RS, Lizneva D, Natterson-Horowitz B, Teede HJ, Yildiz BO. Polycystic ovary syndrome. Nat Rev Dis Primers. 2016; 2:16057.

3. Yin W, Falconer H, Yin L, Xu L, Ye W. Association Between Polycystic Ovary Syndrome and Cancer Risk. JAMA Oncol. 2019; 5 (1):106-07.

4. Brewer CJ, Balen AH. The adverse effects of obesity on conception and implantation. Reproduction. 2010; 140 (3):347-64.

5. Glueck CJ, Goldenberg N. Characteristics of obesity in polycystic ovary syndrome: Etiology, treatment, and genetics. Metabolism. 2019; 92:108-20.

6. Motta AB. The role of obesity in the development of polycystic ovary syndrome. Curr Pharm Des. 2012; 18 (17):2482-91.

7. Balen AH, Morley LC, Misso M, Franks S, Legro RS, Wijeyaratne CN, Stener-Victorin E, Fauser BC, Norman RJ, Teede H. The management of anovulatory infertility in women with polycystic ovary syndrome: an analysis of the evidence to support the development of global WHO guidance. Hum Reprod Update. 2016; 22 (6):687-708.

8. Costa EC, De Sá JCF, Stepto NK, Costa IBB, Farias-Junior LF, Moreira S, Soares EMM, Lemos T, Browne RAV, Azevedo GD. Aerobic Training Improves Quality of Life in Women with Polycystic Ovary Syndrome. Med Sci Sports Exerc. 2018; 50 (7):1357-66.

9. Best D, Avenell A, Bhattacharya S. How effective are weight-loss interventions for improving fertility in women and men who are overweight or obese? A systematic review and meta-analysis of the evidence. Hum Reprod Update. 2017; 23 (6):681-705.

10. Copp T, Cvejic E, McCaffery K, Hersch J, Doust J, Mol BW, Dokras A, Mishra G, Jansen J. Impact of a diagnosis of polycystic ovary syndrome on diet, physical activity and contraceptive use in young women: findings from the Australian Longitudinal Study of Women's Health. Hum Reprod. 2020; 35 (2):394-403.

11. Zhang X, Wen D, Liang J, Lei J. How the public uses social media wechat to obtain health information in china: a survey study. BMC Med Inform Decis Mak. 2017; 17 (Suppl 2):66.

12. He C, Wu S, Zhao Y, Li Z, Zhang Y, Le J, Wang L, Wan S, Li C, Li Y, Sun X. Social Media-Promoted Weight Loss Among an Occupational Population: Cohort Study Using a WeChat Mobile Phone App-Based Campaign. J Med Internet Res. 2017; 19 (10):e357.

13. Sun M, Yang L, Chen W, Luo H, Zheng K, Zhang Y, Lian T, Yang Y, Ni J. Current status of official WeChat accounts for public health education. J Public Health (Oxf). 2020.

14. Barr S, Hart K, Reeves S, Sharp K, Jeanes YM. Habitual dietary intake, eating pattern and physical activity of women with polycystic ovary syndrome. Eur J Clin Nutr. 2011; 65 (10):1126-32.

15. Lin AW, Kazemi M, Jarrett BY, Vanden Brink H, Hoeger KM, Spandorfer SD, Lujan ME. Dietary and Physical Activity Behaviors in Women with Polycystic Ovary Syndrome per the New International
Evidence-Based Guideline. Nutrients. 2019; 11 (11).

16. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Fertil Steril. 2004; 81 (1):19-25.

17. Li J, Ni X (2011) Food Nutrition and Hygiene. China Light Industry Press

18. Wang L, Bai S, Chen J (2013) Health Manager. Beijing: People's Medical Publishing House

19. Pundir J, Charles D, Sabatini L, Hiam D, Jitpiriyaroj S, Teede H, Coomarasamy A, Moran L, Thangaratinam S. Overview of systematic reviews of non-pharmacological interventions in women with polycystic ovary syndrome. Hum Reprod Update. 2019; 25 (2):243-56.

20. Gibson-Helm ME, Lucas IM, Boyle JA, Teede HJ. Women's experiences of polycystic ovary syndrome diagnosis. Fam Pract. 2014; 31 (5):545-9.

21. Htet T, Cassar S, Boyle JA, Kuczynska-Burggraf M, Gibson-Helm M, Chiu WL, Stepto NK, Moran LJ. Informing Translation: The Accuracy of Information on Websites for Lifestyle Management of Polycystic Ovary Syndrome. Semin Reprod Med. 2018; 36 (1):80-85.

22. Wright CE, Zborowski JV, Talbott EO, McHugh-Pemu K, Youk A. Dietary intake, physical activity, and obesity in women with polycystic ovary syndrome. Int J Obes Relat Metab Disord. 2004; 28 (8):1026-32.

23. Álvarez-Blasco F, Luque-Ramírez M, Escobar-Morreale HF. Diet composition and physical activity in overweight and obese premenopausal women with or without polycystic ovary syndrome. Gynecol Endocrinol. 2011; 27 (12):978-81.

24. Amirjani S, Asemi Z, Bazarganipour F, Aramesh S, Allan H, Sayadi M, Tabatabaei MS, Mohamadian Z, Zabti F, Iranpak N, Heydarzadeh A, Taghavi SA, Badehnoosh B, Khashavi Z. Dietary intake and lifestyle behaviour in different phenotypes of polycystic ovarian syndrome: a case-control study. J Hum Nutr Diet. 2019; 32 (4):413-21.

25. Asarian L, Geary N. Modulation of appetite by gonadal steroid hormones. Philos Trans R Soc Lond B Biol Sci. 2006; 361 (1471):1251-63.

26. Alley SJ, Schoeppe S, Rebar AL, Hayman M, Vandelanotte C. Age differences in physical activity intentions and implementation intention preferences. J Behav Med. 2018; 41 (3):406-15.

27. Wang M, Guo Y, Zhang Y, Xie S, Yu Z, Luo J, Zhang D, Ming Z, Li X, Yang M. Promoting healthy lifestyle in Chinese college students: evaluation of a social media-based intervention applying the RE-AIM framework. Eur J Clin Nutr. 2020.

28. Shepherd R, Towler G. Nutrition knowledge, attitudes and fat intake: application of the theory of reasoned action. J Hum Nutr Diet. 2007; 20 (3):159-69.

Tables

Due to technical limitations, table docx is only available as a download in the Supplemental Files section.