Master of Science in Public Health

Impact of a Nutritional Education Intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary Hospital of Sialkot city: A quasi experimental study

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Impact of a Nutritional Education Intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary Hospital of Sialkot city: A Quasi-Experimental study

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ABSTRACT

INTRODUCTION: PCOS is a complex illness. It is difficult to understand and explain the core mechanism. Therefore, treatments that target clinical symptoms rather than cure the syndrome are not miraculous treatments.In addition, the inclusion of nutritional education has significant implications, as these activities related to gender knowledge and athletic pictorial and linguistic support in women suffering from polycystic ovary syndrome are helpful.

OBJECTIVES : The objectives for the given research are to assess the baseline knowledge and practices of women with PCOS visiting the public Tertiary hospital of Sialkot city.To assess the impact of a nutritional education intervention on knowledge and practices of women with PCOS visiting the public Tertiary hospital of Sialkot city.To find association of socio-demographic factors with impact on knowledge and practices of women with PCOS.

METHODOLOGY: The purpose of using a Quasi-Experimental study design is to analyse the outcomes of the intervention. Tertiary hospital of Sialkot city is study setting for the investigation of the impacts of the nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome.Sample size of 27 is calculated by using G power of 80% power -G Power.Only 20 patients were recruited for study due to low response rate .So 20 women with polycystic ovarian syndrome from Gynae OPD of tertiary hospital sialkot city. The data was collected before and after applying ingtervention.Descriptive and inferential statistics techniques were used for analysis.For checking impact on knowledge and practices of nutritional education intervention Pair t test was used , for checking association of sociodemographics with pre and post intervention data ANOVA and independent t test were used.

RESULTS: out of 20 participants with the polycystic ovarian syndrome, there was significant difference of means . For checking impact on knowledge and practices 2 variables were computed as pretestcompute and posttestcompute on SPSS.

Paired T test was run to check mean in pre and post test data. Nutritional education intervention showed that mean (M=8.75, SD=2.531) in pretestcompute is lower as compare to posttestcompute (M=16.45, SD=1.932). There was signficnat differnce in before and after intervention.

CONCLUSIONS :

Basline knowledge and practices about diet for PCOS of patients is assesed. The impact of education intervention showed significant improvement in the knowledge and practices of patients. Hence nutrition education intervention is effective and showed improvement in knowledge and practices of women with PCOS and will help to manage the disease and create awareness for prevention of other metabolic syndromes in later part of life.

KEYWORDS: Annual incidence, hyperandrogenic , nutritional intervention , Oligomenorrhea , Polycystic ovary syndrome.

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I owe my warmest thanks to my husband for his love, care and patience throughout the entire work. He always supports me on every step of my research

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Finally, I apologize if I have caused anger or Offence to any body and the errors that remain in the manuscript are mine alone.

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CHAPTER I: INTRODUCTION

The condition of a polycystic ovary syndrome mainly refers to the production of an unusual amount of androgens which is considered as a male sex hormone by the ovaries and are usually found in the female gender in comparatively fewer numbers (Patel, 2018). A Female who is suffering from this unusual abnormality develops cysts while some do not, as, in this syndrome, a lot of tiny cysts gets formed in the ovary. This syndrome has a great effect on a number of women around the world and causes infertility along with other health associated threats such as obesity, hyperlipidemia, diabetes, problems related to the heart and many more (De et al., 2016). The most common traits for this syndrome includes the irregularity of periods, acne, weigh-gain and mood–swings. In Pakistan, the number of cases related to PCOS is greater when compared to the western states. PCOS in Pakistan is around 6% to 20 %, whereas, in foreign countries, it is somewhere between 4% to 20% (Zehra et al., 2015).

PCOS is a complex condition. The central mechanism is difficult to understand and state. Thereby no treatment can be claimed as a magic bullet as it targets the clinical symptoms rather than curing the syndrome. Alternative drugs such as herbal or medicinal plants should be considered by knowing their mechanism of action. Further investigation regarding pathophysiology and drugs acting on it should be done for improvising the abiding consequence on patient's health. Improvising lifestyle could ease the PCOS related symptomOne of the widely utilised behavioural change theories in nutrition education is the Theory of Planned Behaviour (TPB). According to McDermott et al. (2015), TPB informs the possibility of changes in attitudes, intentions, desire, and skills among individuals for accomplishing sought-after behavioural results. In the context of current subject matter, TPB can allow to examine attitude, knowledge and practices of PCOS women regarding nutritional knowledge including consumption of vegetables and fruits. As per Menozzi et al. (2017), TPB allows to influence subjective norms, behaviour, knowledge, and perceived behavioural control among the targeted population. Undertaking this, the influence of nutritional education intervention can be assessed to observe behavioural changes in knowledge and practices of diet quality and proper nutrition intake among PCOS women. Sok et al. (2021) stated that TPB helps in enhancing attitude towards a subject or phenomenon with undertaking demographics, socio-demographics and awareness aspects to assess changes in intentional behaviour. In the present study, this permit to assess socio-demographic factors to assess knowledge of PCOS women visiting public tertiary hospital about nutrition in Sialkot to assure healthy lifestyle and improve quality of life. Nutritional education intervention based on TPB can enable to analyse

its effectiveness in behavioural change of PCOS women, increasing nutritional practices and knowledge. PCOS is a well-documented lifespan disorder. Accordingly, a personalized diagnostic approach and treatment should be promoted during different life stages (Teede et al., 2018a). The recent International PCOS Guidelines promote the prevention, screening and treatment of PCOS during a woman's reproductive life (Teede et al., 2018b; Peña et al., 2020). The primary interventions comprise healthy lifestyle behaviors and avoidance of excessive weight gain, whereas secondary prevention relies on the early screening of girls at higher risk for PCOS. This guideline also promotes uniform diagnostic criteria, a timely and accurate diagnosis, enhanced education for health professionals and patients, improved screening and diagnosis protocols and the earliest treatment for PCOS-related complications (Conway et al., 2014; Teede et al., 2018a). Obesity has been correlated with abnormal hypothalamic-pituitary ovarian axis function leading to PCOS development (Legro, 2012). Obesity is linked to hyperinsulinemia which further increases the lipid profile, glucose intolerance in PCOS patients. Obesity augments the androgen production by stimulating LH, which in turn leads to hyperandrogenism (Glueck and Goldenberg, 2019). Leptin, an appetite-controlling adipokine has a direct impact on the neuroendocrine and reproductive function of obese PCOS women (Rojas et al., 2014, Barber et al., 2006).Furthermore, hyperleptinemia may hinder ovarian follicular growth (Barber et al., 2006). So, decreasing the visceral fat would control the appetite, glucose levels, lipolysis, and increase the SHBG, thereby regulating the androgen action in the ovary.

Factors such as those related to inheritance, environment and marriages among relatives do contribute a lot to this syndrome. This syndrome can give rise to various health problems and can endanger a female's life. Long-term threats can also be associated with this syndrome; therefore, early identification is required, and the factors of no awareness sessions related to the disease do play a major role in future difficulties (Rosenfield & Ehrmann, 2016). Especially in the village areas of Pakistan, the female gender is shy from visiting the doctors, which result in no proper medications for these suffering women and later disrupt the case. The awareness related to the nutritional educational sector has a great impact and have played a vital role in the improvement in the execution with the PCOS (Arain, Arif & Halepota, 2015).

Individuals who are suffering from PCOS usually have a very deteriorate quality of life and face various problems such as those related to acne, depression, anxiety, loss of hair, weight gain and many more. PCOS is considered a disease that is commonly found in the female gender who are going to give birth and results in blisters or sore bags in their ovaries which is

a barrier for conceiving. An individual suffering from PCOS should immediately take help and assistance from the doctors to avoid deteriorating the case in the future.

PCOS is a syndrome that is mainly related to the endocrine abnormality found in the genital system of the female gender. A lot of research has depicted that the extensive amount of factors such as androgen and lipid metabolism results in various skin diseases such as the production of extensive hair growth, skin patches, acne etc. (Ajmal, Khan & Shaikh, 2019). The adverse effects of PCOS globally is about 4-20%, with about 30% of the rate of infertility among females living in foreign regions (Azziz et al., 2016). The rate of generality in Pakistani women is higher, i.e. 6% to 20%. The programs conducted by the nutritional education has a great impact on the individuals as it is an important part and deals with various nutrition educational activities, and its involvement has assisted in great improvement in the comprehension and exercises of females suffering from PCOS(Haq et al., 2017). Pakistan has made very little stress upon the factor of nutritional education in the light of knowledge and exercise related to the PCOS in individuals and therefore has a lot of space for literature in this regard. They should also take measures for spreading awareness sessions in order to curb the increasing effects of this syndrome.

The number of cases of the syndrome is comparatively higher in Pakistan when compared to the countries of the western world; the ratio is somewhere between 6% to 20%, which is also one of the main factors for infertility among women and is a growing cause of concern. The medical difficulties should be eradicated, and awareness programs should be given utmost priority when developing procedures related to the PCOS for individuals so that their life standard can be improved and proper and appropriate measures can be taken to curb the syndrome in the initial stages.

Moreover, the involvement of nutrition education has a great effect as these activities related to the pictorial and lingual assist in the knowledge and exercises of the female gender suffering from PCOS. The nutrition educational sector plays a vital role in the implementation of a positive mindset among individuals. These awareness sessions stimulate individuals to adapt better standard of life and also to persuade a healthy lifestyle. This factor also assists in providing a sufficient amount of knowledge so that an individual can analyse healthy choices, which would help them in the long run (Lange, 2017). Nutrition education mainly comprises of both pictorial and expressed or lingual activities. The involvement of awareness sessions related to nutrition education has a great impact on the knowledge and exercises of the female gender suffering from a common disease called PCOS (Simha & Agarwal, 2019).

Pakistan has made very little stress upon the factor of nutritional education in the light of knowledge and exercise related to the PCOS in individuals and therefore has a lot of space for literature in this regard. They should also take measures for spreading awareness sessions in order to curb the increasing effects of this syndrome

1.1 Objectives

The objectives for the given research are stated as under:

1. To assess the baseline knowledge and practices about diet for PCOS of women with PCOS visiting the public Tertiary hospital of Sialkot city.
2. To assess the impact of a nutritional education intervention on knowledge and practices of women with PCOS visiting the public Tertiary hospital of Sialkot city.
3. To find association of socio-demographic factors with impact on knowledge and practices of women with PCOS.

CHAPTER II: LITERATURE REVIEW

2.1 Context of Impact of a nutritional education intervention on knowledge and practices

This chapter is grounded on reviewing the information available in the literature with respect To the PCOS patients knowledge and practices about diet for PCOS and impact of a nutrition al Education intervention on it.For this purpose , this chapter explores baseline knowledge and practices of PCOS women visiting public tertiary hospital in sialkot city.

Along with it, the prevalence of PCOS among women and the impact on their quality of life is explored. Also the , nutritional knowledge of patient s is explained. Baseline knowledge then impact of counseling on knowledge and practices of patients are assessed through pre & post Because lifestyle interventions and weight management are major recommendations For PCOS management, identifying the most effective and acceptable lifestyle-related self manage ment strategies in this population may aid them in making lifestyle changes and meeting nutri tion and physical activity suggestions.

An insight of Pakistan's context concerning prevalence of PCOS. The overall burden on the health system. Although PCOS is believed to be one of the most common endocrine disorders.There are very few data available on the prevalence of PCOS in infertile population in Pakistan. The prevalence of PCOS in the infertile population is significantly high. (Contributation, 2010) Further, the relationship of PCOS with nutritional attitude and behavior and the impact of a nutritional education intervention on knowledge and practices of PCOS women visiting the public tertiary hospitals are analysed. Additionally, an association of socio-demographic factors with impact on knowledge and practices of PCOS women is evaluated. Conceptual and theoretical frameworks have been articulated to offer a strong base for the literature. Gaps in literature are mentioned to highlight the contribution of this study. Lastly, the chapter ends with a succinct conclusion.

Nutritional counseling for PCOS patients has been one of the treatment methods for many years.

PCOS is a disease of the modern age that requires proper knowledge and practices the disease, for better management. Awareness about the disease is very less among the accents and young women. Poor knowledge has become a serious problem in the management of the syndrome with, inspite of the increasing prevalence. Educating the adolescent girls regarding polycystic ovarian syndrome helps them to identify the signs and symptoms and early recognition of

polycystic ovarian syndrome and prevent its complications and improve fertility.(Garag & Malagi, 2019)

Polycystic ovary syndrome is a common endocrine disorder affecting women both physically And psychologically and can lead to poor quality of life compared to their normal counterparts. (Khomami et al., 2015). The prevalence of PCOS in the infertile population is significantly high. The analysis of metabolic symptoms occurring in the course of PCOS points to the need for a multidirectional therapeutic approach. The metabolic pathways leading to the abnormalities are presented, which requires focusing on the improvement of parameters related to fertility, hirsutism, the occurrence of carbohydrate-lipid disturbances and the reduction of insulin resistance. One of the most important pathways for blocking carcinogenesis is presented. It has been shown that significant improvement of these parameters depends on modifiable factors related to the improvement of lifestyle, the introduction of a diet, especially a low-calorie diet with reduced GI, normalization of ,sleep and the introduction of daily physical activity. In addition, supplementing the diet with antioxidants and herbs seems to be highly effective in combating the chronic inflammation improving liver steatosis (Silybum marianum, Nigella ,sativa) and the frequently occurring intestinal dysbiosis (probiotic therapy). (Szczuko et al., 2021)

2.2 Global burden of Polycystic Ovarian Syndrome (PCOS)

The adverse effects of PCOS globally are about 4-20% with about 30% of the rate of infertility among females living in foreign regions (Azziz et al., 2016). The rate of generality in Pakistani women is higher i.e. 6% to 20%. The programs conducted on the nutritional education have a great impact on the individuals as it is an important part and deals with various nutrition educational activities and its involvement has assisted in great improvement in the comprehension and exercises of females suffering from PCOS (Haq et al., 2017).

In 2017, 1.55 million (95% UI: 1.19–2.08) incident cases of PCOS among women of reproductive age (15–49 years) were reported globally, representing an increase of 4.47% (2.86–6.37%) from 2007 to 2017. The global age-standardized incidence rate of PCOS among women of reproductive age was 82.44 (64.65–100.24) per 100 000 population in 2017, which represents an increase of 1.45% (1.43–1.47%) from 2007 to 2017

It affects as many as 14% of women in Western Society 1 and 37.3 percent of Kashmiri wom en on the Indian subcontinent. Overall, women with PCOS face a significant cost burden due to reproductive and metabolic issues.

Polycystic ovary syndrome (PCOS), the major endocrinopathy among reproductive-aged women, is not yet perceived as an important health problem in the world. It affects 4%–20% of women of reproductive age worldwide. The prevalence, diagnosis, etiology, management, clinical practices, psychological issues, and prevention are some of the most confusing aspects associated with PCOS. Multiple genetic and environmental factors play an important role in the occurrence of PCOS. The consequences of this multifaceted disorder extend beyond the reproductive system affecting the metabolic, cardiovascular, immune, and psychological health of affected wo men.(Sirait et al., 2022)

2.3 Polycystic ovarian syndrome and its Complications

Menstrual abnormalities, hirsutism, infertility, miscarriage, or associated metabolic diseases (e.g., obesity, dyslipidemia, or insulin resistance) are complications of PCOS. In this regard, more than half of PCOS women seek medical help for infertility issues, with the third quarter primarily complaining of oligomenorrhea or amenorrhea. As a result, clinical characteristics may vary significantly depending on which of Rotterdam's four phenotypes the patient is presenting with.

The complex pathophysiology of PCOS involves the interaction of genetic and epigenetic changes, primary ovarian abnormalities, neuroendocrine alterations, and endocrine and metabolic modifiers such as anti-Müllerian hormone, hyperinsulinemia, and insulin resistance, adiposity, and adiponectin levels. Appropriate diagnosis of adolescent PCOS should include adequate and careful evaluation of symptoms, such as hirsutism, severe acne, and menstrual irregularities 2 years beyond menarche, and elevated androgen levels. Polycystic ovarian morphology on ultrasound without hyperandrogenism or menstrual irregularities should not be used to diagnose adolescent PCOS. Hyperinsulinemia, insulin resistance, and obesity may be present in adolescents with COS, but are not considered to be diagnostic criteria. Treatment of adolescent PCOS should include lifestyle intervention, local therapies, and medications. Insulin sensitizers like metformin and oral contraceptive pills provide short-term benefits otoPCOS symptoms. There are limited data on anti-androgens and combined therapies showing additive/synergistic actions for adolescents. Reproductive aspects and transition should be taken into account when managing adolescents. By the time patients present for medical

attention, this multisystem disorder often has become a self-perpetuating derangement in which identification of initiating factors are difficult. Recent insights from genetic epepidemiolog long-standing clinical investigations in ddictatinga broad etiopathology of PCOS.(Pædiatric et al., 2017)

PCOS is an endocrine disorder influencing 1 in 10 women with experience comorbidities, involving depressive symptoms (Williams, Sheffield & Knibb, 2015). Influence has been observed in terms of changing nathe ture othe f condition, life plans, relationships, education, self-harm, depression, suicidal ideation, and feminine identity (Cipkala-Gaffin et al., 2Concerningect to this, Baqai, Khana,m and Parveen (2010) stated that issues in menstruation have a serious adverse influence on quality of life, including emotions, weight gain, body hair, infertility, and sleeping habits in PCOS women. Mugada and Mandarapu (2021) identified that women in the age group of 15 to 30 years old are the most affected with PCOS due to which they suffer from anxiety, irregular periods and depression that have a tendency to contribute to endometrial cancer. Moreover, an increase in risk of endocrine and cardiovascular diseases have been recorded with excess body hair, facial hair, experiencing difficulty in pregnancy and becoming pregnant that influence quality of life of PCOS women (Baqai, Khanam, & Parveen, 2010). There is lack of awareness and efficient counselling among PCOS women that can bring important shifts in behaviour and attitude of such women (Alessa et al., 2017).

PCOS is associated with symptoms such as absent or irregular menstrual cycles, cystic acne, male pattern hair loss, hirsutism, obesity and darkened skin patches known as acanthosis nigricans. It is a serious issue because of its long term health consequence such as insulin resistance leading to diabetes mellitus, high blood pressure, increased abdominal fat, high cholesterol levels and low HDL. Women with PCOS are also at risk of developing other conditions such as endometrial cancer (Pillay, 2006) which is the second most frequent gynecological malignancy among women.

The disease is also observed to be occurring at much younger age than traditionally believed and pre-teen girls have reported to have insulin resistance, which is a precursor of PCOS at a later age. Awareness regarding various aspects of disease by using a suitable educational module will help in effective management of PCOS by suitable diet and lifestyle changes. Hence the present study was taken with an objective to assess the impact of nutrition education on knowledge and practices of women with PCOS. PCOS is the disease of modern age that

requires proper knowledge and practices about the disease, for better management. Awareness about the disease is very less among the adolescents and young women. Poor knowledge has become a serious problem in management of the syndrome, in spite of the increasing prevalence. Educating the adolescent girls regarding polycystic ovarian syndrome helps them to identify the signs and symptoms and early recognition of polycystic ovarian syndrome and prevent its complications and improve the fertility.(Garag & Malagi, 2019)

Women with PCOS may experience a vaeiety of metabolic and cardiovascular abnormalities as well as psychological illness such as sadness,anxiety,marital and social issues.
While the underlying reasons of these non-reproductive health-
related issues are mostly unclear , they have a significant impact on the quality of life (QoL) of PCOS women
Mood problems, low sexual satisfaction, weight increase, acne, hair loss, pain, infertility, and monthly irregularity have all highlighted as issues that affect women with PCOS's quality of l ife.
Lifestyle management techniques to control these factors have also been proven to improve t he QoL of affected women .Women with PCOS have a higher risk of metabolic syndrome and its cardiovascular sequelae. This is particularly important for Indigenous women who are already at increased baseline risk. Management of PCOS involves attention to current symptoms, fertility and psychosocial issues, as well as prevention of related future health problems including diabetes.(Pfieffer, 2019)
In younger women, reproductive symptoms predominate. The prevalence of metabolic features increases with age but can also occur in younger women who are overweight. Hyperandrogenaemia and insulin resistance are pathophysiological features of PCOS. Women are at risk if they have a genetic predisposition, and the onset of symptoms can be triggered by environmental factors, particularly obesity. It is important to be aware that some population groups have a higher risk of PCOS. This is true of Australian Indigenous women, possibly due to higher levels of insulin resistance and higher rates of obesity. In addition, symptoms may vary with population group, for example, southeast Asian women are less likely to have hirsutism.1,3 pfieffer 2019

PCOS is a syndrome that is mainly related to the endocrine abnormality found in the genital system of the female gender. A lot of research has depicted that the extensive amount of factors such as androgen and lipid metabolism results in various skin diseases such as the

production of extensive hair growth, skin patches acne etc. (Ajmal, Khan & Shaikh, 2019). The adverse effects of PCOS globally is about 4-20% with about 30% of the rate of infertility among females living in foreign regions (Azziz et al., 2016). The rate of generality in Pakistani women is higher i.e. 6% to 20%. The programs conducted by the nutritional education has a great impact on the individuals as it is an important part and deals with various nutrition educational activities and its involvement has assisted in great improvement in the comprehension and exercises of females suffering from PCOS(Haq et al., 2017). Pakistan has made very little stress upon the factor of nutritional education in the light of knowledge and exercise related to the PCOS in individuals and therefore has a lot of space for literature in this regard. They should also take measures for spreading awareness sessions in order to curb the increasing effects of this syndrome .

Sinha et al. (2013) propounded that delivering information via smartphone applications for diet planning, medications, fitness, weight loss, and necessary websites for PCOS women can help improve quality of life, and present potential to control the prevalence of disease. Williams, Sheffield and Knibb (2015) implied that it is due to lack of effective interventions that PCOS is influencing 6% to 8% of adult females who experience symptoms of obesity, hirsutism, alopecia, acne, and menstrual irregularities. PCOS women have been found to suffer from type 2 diabetes, thyroid disorders, irritable bowel syndrome, and higher psychological morbidity levels (Mugada & Mandarapu, 2021). These women have impaired quality of life as psychiatric illness also develops that often goes undetermined. Thus, the prevalence of PCOS among women is increasing due to lack of proper awareness and intervention, leading to decreased quality of life, impact on psychological health, and contribution to development of other risky diseases such as cardiovascular.

2.4 Polycystic ovarian syndrome:Burden on health system

According to the World Health Organization (WHO) estimation re- vealed over 116 million women (3.4%) are affected by PCOS worldwide (Bharathi et al., 2017). PCOS is diagnosed with hyperandrogenism, menstrual irregularities, and varying size of cysts in ovaries, although substantial differences exist between individuals. This multifactorial condition initially develops in adolescents who are at high risk for the emergence of several comorbidities including obesity, type II diabetes, infertility, endometrial dysplasia, cardiovascular disorders, and psychotic disorders (El Hayek et al., 2016, Goodarzi et al., 2011).

The number of cases of the syndrome is comparatively higher in Pakistan when compared to the countries of the western world, the ratio is somewhere between 6% to 20% which is also one of the main factors for infertility among women and is a growing cause of concern. The medical difficulties should be eradicated and awareness programs should be given utmost priority when developing procedures related to the PCOS for individuals so that their life standard can be improved and proper and appropriate measures can be taken to curb the syndrome in the initial stages.

Nutritional and dietary modifications are crucial for the assessment and management of PCOS women, however, only a few of them report receiving nutritional information or education (Douglas et al., 2021). Nutritional education and knowledge can translate to dietary quality and dietary behaviour, and eating disorder risk among PCOS women. Bykowska-Derda et al. (2021) reported that nutritional consistency or intake of nutrition, and dietary quality have been found to be weak among PCOS women due to limited nutritional education and knowledge. There is limited education concerning how and at what times of the day vegetables and fruits must be consumed to increase intake of nutritions due to which it becomes complex. However, Simha and Agrawal (2019) stated that it is also lack of personal health goals or interests along with environmental or social stimuli that influence attainment of nutritional knowledge and education. Since dietary consumption is linked with nutritional knowledge; cholesterol and fat are associated with forming dietary fibre that are considered a first line of therapy for PCOS women. Nevertheless, PCOS women do not receive sufficient nutritional advice from healthcare professionals and seek nutritional information on their own that often leads to increasing chronic health risk (Szczuko et al., 2017).

In addition, we observed the highest PCOS incidence among women aged 15–19 years, consistent with the observation that PCOS usually begins during puberty (Ehrmann et al.,1995; Apter,1998). However, it is difficult to diagnose PCOS during adolescence (Legro et al., 2013), as the manifestations overlap with the physiological changes of puberty (Witchel et al., 2019). Currently, there is no universal standard for the diagnosis of PCOS in adolescents (Witchel et al., 2015).

Polycystic ovary syndrome (PCOS) is among the most common endocrine disorders and a major cause of anovulatory infertility in women of reproductive age (15–49 years) (Szilágyi and Szabó, 2003; Balen et al., 2016). Globally, the estimated prevalence of PCOS ranges between 5% and 15% (Azziz, 2016). Compelling evidence suggests that women with PCOS have significantly higher risks of obesity, dyslipidemia, impaired glucose tolerance, and long-

term complications such as diabetes, endometrial cancer, and cardiovascular disease (Lim et al., 2012; Wild 2012; Peigné and Dewailly, 2014).

Previous efforts to monitor the PCOS epidemic have focused mainly on reporting the prevalence of disease (Yildiz et al., 2012; Ding et al., 2017; Wolf et al., 2018). However, the annual incidence of PCOS, defined as the rate of new cases per year, provides a better reflection of the epidemiological changes associated with this disease (Guang, 2009). The disability-adjusted life-years (DALYs), a comprehensive measurement of premature mortality and disability, are an advantageous measure that can be compared directly across geographical areas (Capone, 2019).

Globally, the age-standardized prevalence of infertility and associated DALYs among women increased by 0.370% and 0.396% per year, respectively, from 1990 to 2017 (Sun et al., 2019). As PCOS is the most common cause of anovulatory infertility in women (Balen et al., 2016), a better understanding of the current burden of PCOS is essential for the primary prevention of infertility.

To our knowledge, no detailed quantitative estimates of the PCOS incidence and associated DALYs by age and socio-demographic index (SDI) across countries and territories has been published. Therefore, we aimed to provide a comprehensive estimate of the age- and SDI-stratified PCOS incidence at the global, regional, and national levels using data collected from 194 countries and territories during the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD, 2017). Here, we present: the estimated PCOS incidence and DALYs for women of reproductive age; the age-standardized PCOS incidence and DALYs in this population in both 2007 and 2017; and the trends in both variables from 2007 to 2017.

Therefore, PCOS women are at growing risk of eating disorder as limited nutritional advice and knowledge are provided for developing efficient lifestyle and managing the disease. Women with PCOS have similar challenges in terms of lifestyle and weight control as wome n of reproductive age without PCOS, such as conflicts with job and family obligations or a di slike for the "mundaneness" of a restricted diet.
These obstacles may contribute to women of reproductive age having a higher risk of weight gain .However, aspects of PCOS, notably psychological manifestations of body dissatisfactio n and depressive symptoms, exacerbate these basic hurdles.

For example, not having an appropriate area to exercise is linked to feelings of embarrassmen t about being seen outside or in a gym, which is linked to negative thoughts about feeling mel ancholy.

The polycystic ovary syndrome (PCOS) is the most common endocrine abnormality of reproductive-aged women today, affecting approximately 6.6% of unselected reproductive-aged women (approximately 4 million women in the United States) (1990 National Institutes of Health criteria), and potentially represents a significant financial burden to our health care.annual incidence of PCOS, defined as the rate of new cases per year, provides a better reflection of the epidemiological changes associated with this disease (Guang, 2009).

2.5 Operational definitions

2.5.1 Polycystic ovary syndrome

Polycystic ovary syndrome is a common endocrine disorder affecting women both physically and psychologically can lead to a poor quality of life compared to their normal counterparts. (Khomami et al., 2015)

The condition of a polycystic ovary syndrome mainly refers to production of an unusual amount of androgens which is considered as a male sex hormone by ovaries and are usually found in the female gender in comparatively fewer numbers (Patel, 2018).

2.5.2 Nutritional intervention

A nutritional intervention is to resolve or improve the nutrition diagnosis by provision of advice, education focusing on knowledge and practices.

2.5.3 Oligomenorrhea

Oligomenorrhea refers to infrequent or abnormally light bleeding in people who menstruate. As a medical diagnosis, it specifically refers to when a typically normal menstrual cycle begins lasting longer than 35 days, or a person has fewer than nine menstrual periods in an entire year. There are several causes of oligomenorrhea, some of which are harmless. It can also be a sign of a more serious health condition.

2.5.4 Hyperandrogenic

hyperandrogenism is evidenced by raised levels of free(unbound) testosterone in the bloodstream, a key hormone contributing to the pathophysiology of PCOS. This complex condition is deconstr ucted into its main pathophysiological elements (Ibáñezet al., 2017).

2.5.5 Annual incidence

annual incidence of PCOS, defined as the rate of new cases per year, provides a better reflecti on of the epidemiological changes associated with this disease (Guang, 2009).

2.6 Conceptual framework of Impact of a nutritional education intervention on knowledge and practices of women with PCOS

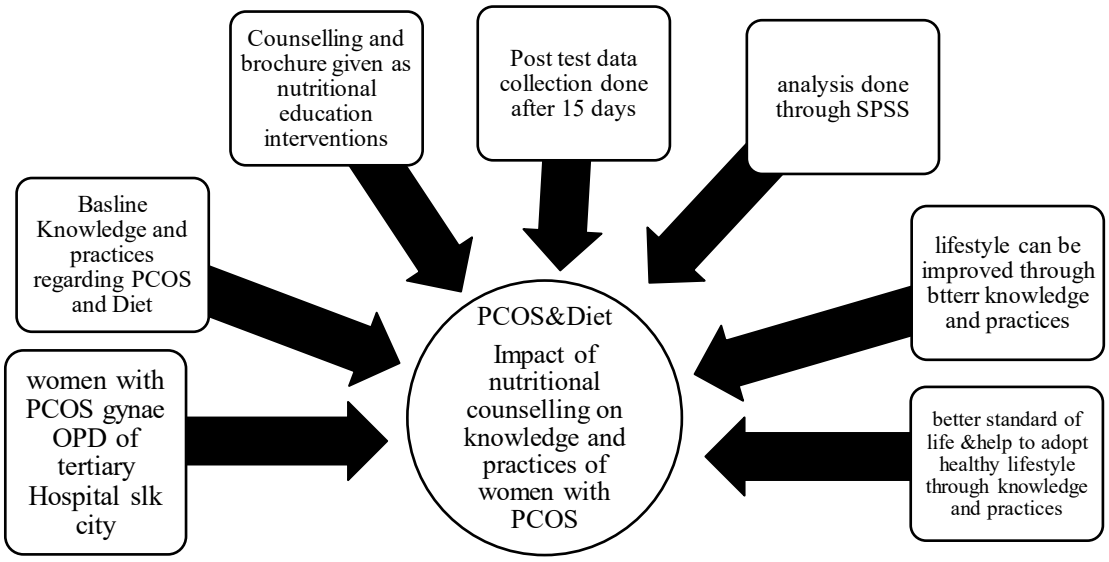
The analysis of the impacts of a nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Sialkot city is conceptualised by developing the direct relationship between the intervention and the outcomes of the intervention (in terms of knowledge and practices). There are three variables of the study, including intervention (independent variable) and two dependent variables change in knowledge and practices of the participants.

Knowledge of attitude and practices for Lifestyle change is the first line of treatment for the management of women with PCOS but is not an alternative to its pharmacological treatment . Regular physical activity, healthy eating attitude and practices, maintaining appropriate body weight, following healthy dietary patterns and avoiding tobacco use is vital in prevention and treatment of metabolic disorders, and is included in clinical guidelines for various conditions. Focusing on overall wellbeing and mental health is a personal choice, and while it is not an immediate fix, it is an important step towards a more fulfilling life.

Nutritional counseling for PCOS patients has been one of the treatment methods for many years. However, strict caloric restrictions do not produce the expected long-term effects , and the isocaloric diet did not significantly improve the biochemical and anthropometric parameters even in combination with physical activity .(Szczuko et al., 2021) PCOS is a long-term disease

with greater chances of other comorbidities like type II diabetes linked with it, so lifestyle modification is the crucial and simple approach for implementation in women with PCOS (Carmina, 2012). Studies revealed that changes in the lifestyle, including diet, exercise, and, attitude have a positive impact on body weight,insulin resistance, and testosterone levels (Moran et al., 2011)

Figure 1: Conceptual framework of Impact of a nutritional education intervention on knowledge and practices of women with PCOS



2.7 Similar literature used international and national

The number of cases of the syndrome is comparatively higher in Pakistan when compared to the countries of the western world, the ratio is somewhere between 6% to 20% which is also one of the main factors for infertility among women and is a growing cause of concern. The medical difficulties should be eradicated and awareness programs should be given utmost priority when developing procedures related to the PCOS for individuals so that their life standard can be improved and proper and appropriate measures can be taken to curb the syndrome in the initial stages.

2.7.1 Situation of polycystic ovarian syndrome in Pakistan

The number of cases of the syndrome is comparatively higher in Pakistan when compared to the countries of the western world; the ratio is somewhere between 6% to 20%, which is also one of the main factors for infertility among women and is a growing cause of

concern. The medical difficulties should be eradicated, and awareness programs should be given utmost priority when developing procedures related to the PCOS for individuals so that their life standards can be improved and proper and appropriate measures can be taken to curb the syndrome in the initial stages. Pakistan has made very little stress upon the factor of nutritional education in the light of knowledge and exercise related to the PCOS in individuals and therefore has a lot of space for literature in this regard. They should also take measures for spreading awareness sessions too curb the increasing effects of this syndrome. Modifications in lifestyle as first-line treatment are suggested in PCOS women visiting the public tertihospitalsital (Chemerinski et al., 2020). Nevertheless, usual physical activity and dietary attitudes of PCOS women remain uncertain as variations have been found in diet quality and dietary intake. Lin et al. (2019) agreed and added that PCOS women meet acceptable macronutrients ranges of distribution for fat, carbohydrate, and protein, however, do not reach suggested dietary reference intakes for vitamin B9, D, sodium, and total fiber. The authors concluded that there is a lack of effective targeted interventions for physical activity and dietary intake that facilitate new guidelines to promote healthy lifestyle suggestions for PCOS management. In this regard, Lin and Lujan (2014) asserted that for management and assessment of PCOS, importance must be given to physical activity and diet for handling PCOS symptoms and signs, and avoiding complications of metabolism related to the syndrome. For this, practices of weight management across the life course for all PCOS women involving weight loss with comorbid obesity or overweight, and prevention of weight gain for women within a range of healthy weight are considered (Khomami et al., 2015). Focus on weight management practices and knowledge is necessary as obesity worsens metabolism and reproductive profiles among PCOS women (Teede et al., 2018).

In contrast, Ahmadi et al. (2013) found that poor diet knowledge and practices have been related to individual characteristics of PCOS involving polycystic ovaries and hyperandrogenemia along with self-reported infertility. Nonetheless, PCOS women have poor diets or/and take part in shorter physical activity intervals that lead to weight gain propensity. On the other hand, Yavarikia et al. (2019) alluded that enhanced quality of life has been observed in PCOS women, albeit in combination with longer sitting intervals and improved energy intake. However, no major differences have been found in sedentary attitudes or physical activity between women without or with PCOS. Therefore, PCOS women visiting public tertiary hospitals have poor diet knowledge, diet quality, weight management, and physical activity that lead to weaker metabolism, and infertility, contributing to PCOS symptoms.

Polycystic ovary syndrome (PCOS) is a hormonal disorder in women of reproductive age. It seems that over the recent years, PCOS has augmented in adolescent girls due to unhealthy food habits and obesity. So, the present study was conducted to explore the food habits of overweight and obese adolescent girls with PCOS. (Hajivandi et al., 2020)

Moreover, the involvement of nutrition education has a great effect as these activities related to the pictorial and lingual assist in the knowledge and exercises of the female gender suffering from PCOS. The nutrition educational sector plays a vital role in the implementation of a positive mindset among individuals. These awareness sessions stimulate individuals to adapt better standard of life and also to persuade a healthy lifestyle. This factor also assists in providing a sufficient amount of knowledge so that an individual can analyse healthy choices which would help them in the long run (Lange, 2017). Nutrition education mainly comprises of both pictorial and expressed or lingual activities. The involvement of awareness sessions related to nutrition education has a great impact on the knowledge and exercises of the female gender suffering from a common disease called PCOS (Simha & Agarwal, 2019).

2.7.2 International literature on PCOS and diet

Literature is rich in discussing baseline practices and knowledge of PCOS women. However, it lacks in context of public tertiary hospital. Nevertheless, a plethora of studies can be found concerning the prevalence of PCOS, and impact on quality of life of women. However, little attention has been paid towards identifying nutritional knowledge among PCOS women, and there is sufficient lack of delivering nutritional education to PCOS women to improve their diet plan and quality. While, debate around the relationship between nutritional knowledge and PCOS has been sufficiently developed in the current body of knowledge. However, compelling research lacks in assessing the influence of nutritional education intervention on knowledge and practices of PCOS women. Additionally, not much focus has been given to socio-demographic factors influencing practice and knowledge of PCOS women. Considering the gaps, this research adopts quasi-experimental research to examine causes and factors to reach implications, novel findings, and practical conclusions.

CHAPTER III: METHODOLOGY

PCOS is a very complex condition. The central mechanism is complicated to understand and state. The materials and methods provide a path to researcher how to complete the procedure of collecting, analysing and interpretation of data.

3.1 Study design

For the conducted research study about the investigating the impacts of the nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Sialkot city Quasi-Experimental study design is used. The purpose of using a Quasi-Experimental study design is to analyse the outcomes of the intervention (Attached in Appendix). Research study design is a framework, or the set of methods and procedures used to collect and analyze data on variables specified in a particular research problem.

3.2 Study setting

Tertiary hospital of Sialkot city is study setting for the investigation of the impacts of the nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome.

3.3 Study Participants

In this study after getting approval from the hospital 20 PCOS patients were selected from Gynae Out patient department after necessary coordination with the participants including informed consent form.

3.4 Study Duration

Study duration was of 6 months.

3.5 Inclusion and exclusion criteria

The inclusion and exclusion criteria of the research regarding the investigation of the impacts of the nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Sialkot city include the following aspects:

Inclusion criteria:

1. Women with PCOS in Tertiary hospital of Sialkot city
2. Informed consent

Exclusion criteria:

1. Women with conditions of reproductive symptoms similar to Polycystic ovary syndrome
2. Non volunteers

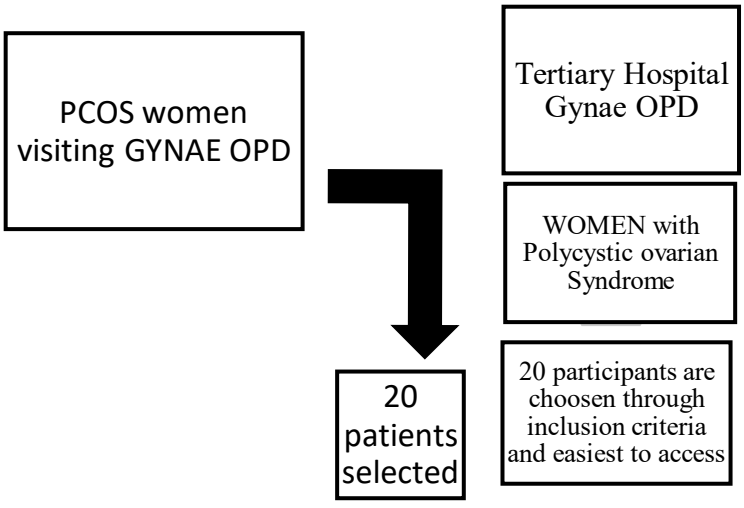
3.6 Research Sampling technique

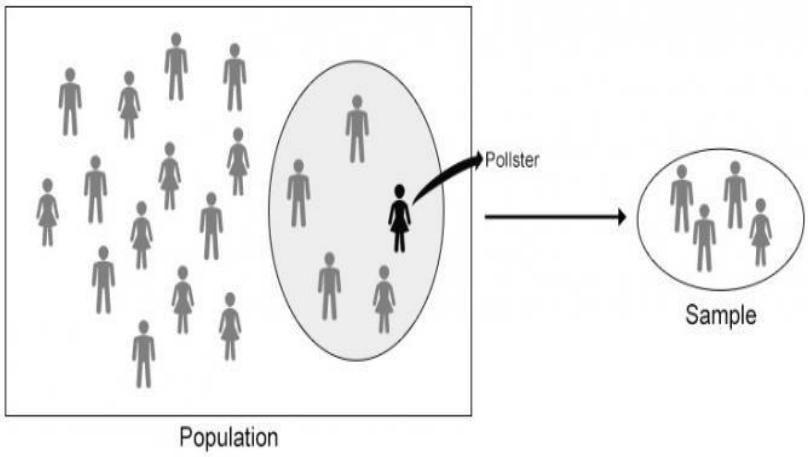
Sampling is the technique of collecting data in statistical research (Zehra et al., 2015). For the investigation of the impacts of the nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Sialkot city consecutive non-probability sampling technique is used. Meanwhile, the sample size calculated by mean difference is 20. Therefore, 20 participants are selected for the intervention participation and data collection. The instrumentation of the data collection is executed within the Public Tertiary hospital of sialkot city and effectively designed; based on several sub-sections, questionnaires are circulated to gather the data.

3.7 Sample size

Sample size is calculated by using mean difference of 20 units - OpenEpi Menu (Garag & Malagi, 2019) .So sample size is 20 women with polycystic ovarian syndrome from Gynae OPD of tertiary hospital sialkot city.

Figure 2: Research Sampling Technique





Convenience Sampling

3.8 Data collection Procedure

Data collection is the first actual step of research conduct in which the information is gathered and reviewed by the researchers for the development of the context and comprehension of the research topic (Haq et al., 2017). There are two types of data collection techniques that are used for scientific research, including primary data collection and secondary data collection. For the investigation of the impacts of the nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Sialkot city primary data collection is done because the numeric data is collected directly from the participants in the study for the evaluation of the relationship of the applied intervention (Appendix) upon the outcome of the research.

Data is collected twice with a interval of 15 days after the interventions. Educational intervention was performed in 2 sessions with a gap of 15 days. The researcher asked them to attend the nutritional education intervention sessions. Data was collected initially at the start to check baseline knowledge and practices and then after 15 days of intervention to asses the impact of intervention.

3.9 Collection Tool

Research instrument used is adapted questionnaire. Tool was adapted from Polycystic Ovarian Syndrome Questionnaire- PCOSQ (Cronin et al., 1998) , Eating habits questionnaire-EHQ (Edy Susanto,2019) and GNK general nutrition knowledge questionnaire.

Questionnaire includes 47 items. It consists of 7 main sections Sociodemographic, clinical PCOS history, Knowledge of PCOS , Knowledge of diet for PCOS , patient's practices for healthy eating , patient's attitude toward healthy eating for PCOS and general health section.

Data for the research purposes is collected by primary source. Primary data is the new source from which researchers collect data directly by using several methods like a close-ended questionnaire, observations and personal interviewing, etc. Secondary data is the source that contains data collected and collected for other purposes, such as: census reports, annual reports and company accounts etc. Secondary data for any study can gathered by previous surveys, books, periodicals, articles, research and web sites. Then the data collected from various sources are arranged and tabulated as per the requirements of the study. The examination of the present study is conducted using appropriate statistical and mathematical tools, including percent, mean, correlation, standard deviation, and regression analysis, depending on the objectives of the study.

Table 1. Questionnaire/Tool used for study

Sections/Domains	Subscales
Section A It was about socio demographic information including age education, family income , employment.	8 items
Section B Knowledge of PCOS used Polycystic Ovarian Syndrome Questionnaire	It includes 26 items for the Polycystic Ovary Syndrome Questionnaire (PCOSQ).It grouped the 26 items into 5 domains: emotions (8 items), body hair (5 items), weight (5 items), infertility (4 items), and menstrual problems (4 items) PCOSQ (Cronin et al., 1998) 6 items
Section C Clinical PCOS history	11 items
Section D Knowledge about PCOS & Dietary habits	7 items
Section E Practices and about healthy eating	3 items
Section F Attitudes about healthy eating	2 items
Section G Nutritional practices by eating habits questionnaire-EHQ (Edy Susanto,	5 items
Section H General Health	5 items

Pilot testing:

A pilot study was conducted to improve and refine the contents of the questionnaire. This pilot study was conducted at tertiary hospital where 4 participants were chosen as a sample of convenience to complete the questionnaire. The results of the pilot study indicated that the participants were similar to those in the study in terms of culture and that all questions were not clear. Therefore, after pilot testing we did no amendments in the questionnaire.

3.10 Nutritional Education Intervention

Nutritional Educational intervention was performed in 2 sessions with a gap of 15 days. The researcher asked PCOS patients to attend the nutritional education intervention sessions. Data was collected initially at the start to check baseline knowledge and practices and then after 15 days of intervention to assess the impact of intervention. First session of intervention was nutritional counselling regarding knowledge and practices of PCOS diet. After 15 days patients attended session again the other session was nutritional education brochure given and explained to them briefly**.**

Counselling about diet for polycystic ovarian syndrome Women

Subjects were recommended a self-selected diet of 1,500–1,800 kcal/d of conventional foods based on the Food Guide Pyramid and an exercise goal starting at 50 minutes per week and increasing to 175 minutes per week. Counseling included standard weight loss skills including self-monitoring, problem-solving, enlisting social support, and overcoming negative thoughts.

A healthy, balanced diet will help to reduce and manage some of the symptoms of polycystic ovary syndrome and can assist with weight management, helping to regulate insulin levels. Finding the right diet to tackle the symptoms of PCOS can be a complex process and needs to be tailored to each person's symptoms and lifestyle. Contacting a suitably qualified nutrition professional will help you understand and manage the dietary and lifestyle change

Weight gain is one of the most common side effects of PCOS. Whilst it is essential that women with PCOS seek professional medical advice and treatment for the condition, a nutrition professional could provide individuals with extra support if they are struggling to manage their PCOS diet independently.

According to the NHS, individuals losing just 5% of their body weight will experience an improvement in symptoms of polycystic ovary syndrome.

Dietary habits and atitudes advice

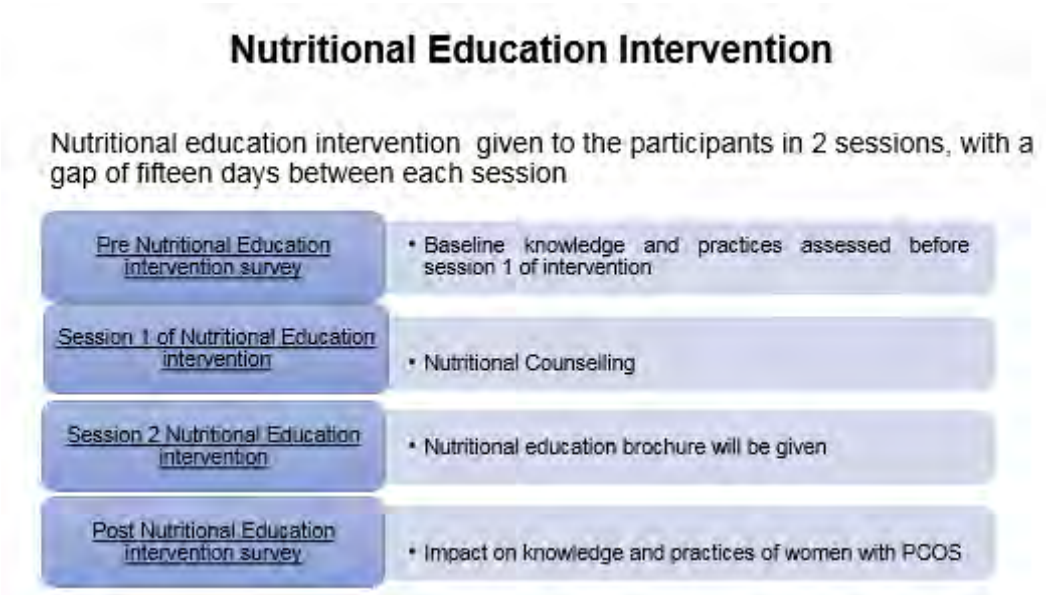
The glycaemic index is a way to monitor how quickly the blood glucose rises after eating carbohydrates. Foods with a low GI can cause your blood levels to rise slowly, and it's thought that these are helpful in reducing the symptoms of PCOS.

Low GI foods can improve and help balance insulin levels; women with PCOS are often resistant to the effects of insulin, therefore, they have more insulin in their blood. This rise in insulin levels means the levels of testosterone are also increased. The increase in both insulin and testosterone upsets the natural hormone balance in the body, which can cause symptoms to flare up.

Women with the condition may find replacing high GI foods effective, even if they do not need to lose weight. It has also been found that, when combined with weight-loss, a low GI diet can help regulate the menstrual cycle.

As well as the potential to help ease some of the symptoms worsened by being overweight, a balanced, nutritious diet will also help to reduce a woman's risk of developing diabetes and heart disease as well as improve overall health and well-being.

Figure 3 Nutritional Education interventions used



3.10 Plan of Analysis

Data analysis is the second and most important phase of scientific research studies after the data collection (De et al., 2016). For the formulation of the results, demographic analysis, frequency analysi are done.

In this research, the data is analyzed through SPSS software (Statistical Package for the Social Sciences) 26. SPSS is the flexible package that helps to analyze several types of data. The quantitative approach involves questionnaire which contains close ended of five-point Likert scale type. For this purpose, 25 questionnaires were given to the women with PCOS out of that 20 were usable for this study. After accumulating the questionnaires, data is analyzed through SPSS software (Statistical Package for Social Sciences 26) and percentage, mean, standard deviation and variance were computed.

3.10.1 Independent Variables

Sociodemographic variables e.g., gender ,education,employement statust and nutritional education interventions are the predictor variables.

3.10.2 Dependent Variables

Knowledge and practicees of wpmen with PCOS are dependent or outcome variablesof this study.For qualitative variablespercentages and frequencies were taken.For quantitative mean and standard deviationwere taken.

3.10.3 Descriptive Analysis

Descriptive analysis of demographic data of sample population was done.catagrorical data was summarized in th form of frequencies and percentages.

3.10.4 Inferential Analysis

Second part is inferential analysis.Paired t tests is applied to check Impact of a nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Sialkot city. Independent t test and ANOVA is used to check association of sociodemographic factors with impact on knowledge and practices of PCOS patients.

3.11 Ethical considerations

The conducted study regarding the investigation of the impacts of the nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Sialkot city is a primary and quantitative study which has involved direct involvement of the participants for the collection of data. Therefore, ethical considerations of the conducted study are very specific. Since the research is based on a Quasi-Experimental study, the relationship between the intervention and the outcome. Thus, the safety of the participants, autonomy, privacy, security of the data, and originality of the research is the basic ethical considerations of the conducted research study (Arain, Arif & Halepota, 2015).

CHAPTER IV: RESULTS

4.1 DESCRIPTIVE STATISTICS

4.1.1 DEMOGRAPHIC CHARACTERISTICS

This Quasi Experimental study was designed to check the impact of nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting tertiary hospital of Sialkot city.

A total of 20 subjects participated in this study all were women (n=20) with PCOS.

Women recruited for this study were in different relationship levels 13(54.2%) were single, 6(25%) were married and 1(4.2) was widowed. Education varied in different Patients 2 (8.3%) were illiterate, 9(37.5%) were in high school, 2 (8.3%) having bachelor's degree and 7 (25.2%) had master's degree.

Talking about area 14(58.3%) were from urban and 6(25.3%) were from rural background.

PCOS is syndrome of reproductive age groups. 6(25%) patients were less than 18, nine (37.5%) were from 18 to 25, 4(16.7%) were from 26 to 35 and 1(4.2%) was from more than 35 age groups.

Twelve (50%) were from Sialkot district and 8(33.35) were from other districts of Pakistan. 13 patients were employed and 7 were unemployed.

Table 2.Sociodemographic Characteristics of Women with PCOS

Sr No	Variables	Categories	Frequency (F)	Percentage (%)
1	Relationship Status	Single	13	54.2
		Married	6	25
		Widowed	1	4.2
2	Education	Illiterate	2	8.3
		High School	9	37.5
		Bachelor's	2	8.3
		Master's	7	25.2
3	Area	Urban	14	58.3
		Rural	6	25.3
4	Age	Less than 18	6	25
		18 to 25	9	37.5
		26 to 35	4	16.7
		More than 35	1	4.2
5	Permanent Resident	Sialkot District	12	50
		Other district	8	33.3
6	Employment	Employed	13	54.2
		Not Employed	7	29.2

4.2 INFERENTIAL STATISTICS

OUTCOME VARIABLES

Pair t test was run to check the impact of nutritional education intervention on knowledge and practices of PCOS patients.

4.2.1 IMPACT ON KNOWLEDGE AND PRACTICES

Table 3:Paired sampes T test

	Paired Differences						
	Mean	**Standard Deviation**	**95% Confidence interval of difference**		**t**	**df**	**Sig.(2-tailed)**
Pair Pretest Posttest	7.700	2.408	**Lower** 1.932	**Upper** 9.252	14.299	4	0.005

For checking impact on knowledge and practices 2 variables were computed as pretestcompute and posttestcompute on SPSS. Pair T test was run to check mean in pre and post test data. Nutritional education intervention showed that mean (M=8.75, SD=2.531) in pretestcompute is lower as compare to posttestcompute (M=16.45, SD=1.932). There was significant diffeernce before and after intervention.

4.2.2 ASSOCIATION OF SOCIODEMOGRAPHICS WITH IMPACT ON KNOWLEDGE AND PRACTICES

4.2.2.1 Age's Association with Pre and Post intervention knowledge and practices

Age Groups	**N**	**Mean**	**Std Deviation**	**Mean Differnce**	**Sign.**	**t(df)**
18 to 25	13	14	1.9	1.099	0.500	1.4 (18)
25 to 35	7	12	3.6			1.2 (7.8)
	N	**MEAN**	**Std Deviation**	**Mean Difference**	**Sign.**	**T(df)**
Post test 18 to 25	13	17	3.5	1.835	0.500	(18)
Post test 25 to 35	7	18	3.1		0.487	(13.7)

Independent sample t test was run to check association of imopact on knowledge and practices with age .There was statistically significant difference in pre intervention means in different age groups.Independent t test was conducted after checking assumptions of normality and homogenity of variance(leven's test)Results showed that different age groups had significant different means for impact on knowledge and practices.Results showed that with increasing age groups there is increase in scores of total impact on knowoledge and practices and it was statistically significant.

4.2.2.2 Relationship status association with Pre and Post intervention knowledge and practices

Anova was used for it.There was statistically significant difference in pre intervention means in different age groups.A one analysis of variance was conducted after checking assumptions of normality and homogenity of variances(Leven's test).Results showed that with in different relationshoip status there is inccrease in scores of total impact on knowoledge and practices and it was statistically significant F ANOVA was run with age as independent and impact of intervention on knwoledge and practices as dependent variables. [F(55.49 , 163.25)=2.651 , p=0.136].

Table 4.1 Relationship status association with Pre and Post intervention knowledge and practices

ANOVA PRETEST					
	Sum of Squares	df	Mean Square	F	Sig.
between groups	25.494	2	12.747	2.251	.136
Within groups	96.256	17	5.662		
Total	121.750	19			

ANOVA POSTTEST					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
between groups	7.040	2	3.520	.936	.411
Within groups	63.910	17	3.759	63.910	17
Total	70.950	19			

`*significant at 0.05 95% CI of signIficant highlight

4.2.2.3 Education Association with Pre and Post intervention knowledge and practices

Anova was used for it.There was statistically significant difference in pre intervention means in different age groups.A one analysis of variance was conducted after checking assumptions of normality and homogenity of variances(Leven's test).Results showed that with in increasing education level there is inccrease in scores of total impact on knowoledge and practices and it was statistically significant F ANOVA was run with age as independent and impact of intervention on knwoledge and practices as dependent variables. [F(44.43 , 77..25)=3.065 , p=0.056].

Table 4.2 Education Association with Pre and Post intervention knowledge and practices

ANOVA PRETEST					
	Sum of Squares	df	Mean Square	F	Sig.
between groups	44.433	3	14.811	3.065	.058
Within groups	77.317	16	4.832		
Total	121.750	19			

ANOVA POSTTEST					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
between groups	6.394	3	2.131	.528	.669
Within groups	64.556	16	4.035		
Total	70.950	19			

`*significant at 0.05 95% CI of signIficant highlight

4.2.2.4 Area Association with Pre and Post intervention knowledge and practices

Independent sample t test was run to check the association b/w are and impact on knowledge and practices of PCOS patients. There was a significant difference in the scores for urban(M=18.87 SD=3.662) and rural (M=17.1667, SD=2.3296).Conditions;t(18)=0.487,p=0.675.

Table 5:**Area Association with Pre and Post intervention knowledge and practices**

Pretest	**N**	**Mean**	**Sttandard Deviation Std.**	**t**	**df**	**p**
Urban	14	14	3.133	.165	18	0.904
Rural	6	14	1.34	.122	17.9	
Post test	**N**	**Mean**	**Std.**	**t**	**df**	**P**
Urban	14	18	3.662	0.487	18.75	0.675
rural	6	17	2.329	0.421	12.78	

CHAPTER V:DISCUSSION

PCOS is the disease of modern age that requires proper knowledge and practices about the disease, for better management. Awareness about the disease is very less among the adolescents and young women. Poor knowledge has become a serious problem in management of the syndrome, in spite of the increasing prevalence. Educating the adolescent girls regarding polycystic ovarian syndrome helps them to identify the signs and symptoms and early recognition of polycystic ovarian syndrome and prevent its complications and improve the fertility. The main purpose of this study was to provide information regarding impact of nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome. This intervention was designed to improve pateinst knowledge and practices toward healthy eating.Th current study is investigating the impact of nutrtional counselling on patients baseline knwoeldge of disease and diet.

Findings of this study indicated that with increasing age , there is increase in score of total impact.These were in according to what was found by G vani and M usha.(2019)

This Quasi Experimental study was designed to check the impact of nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting tertiary hospital of Sialkot city. A total of 20 subjects participated in this study all were women (n=20) with PCOS. Women recruited for this study were in different relationship levels 13(54.2%) were single, 6(25%) were married and 1(4.2) was widowed. Education varied in different Patients 2 (8.3%) were illiterate, 9(37.5%) were in high school, 2 (8.3%) having bachelor's degree and 7 (25.2%) had master's degree. Talking about area 14(58.3%) were from urban and 6(25.3%) were from rural background. PCOS is syndrome of reproductive age groups. 6(25%) patients were less than 18, 9(37.5%) were from 18 to 25, 4(16.7%) were from 26 to 35 and 1(4.2%) was from more than 35 age groups. 12 (50%) were from Sialkot district and 8(33.35) were from other districts of Pakistan. 13 patients were employed and 7 were unemployed.

G. Vani and M.usha condcuted a study with different setting and found impact of education intervention showed significant improvement in the knowledge and practices of patients. Hence nutrition education intervention is effective and showed improvement in knowledge and practices of women with PCOS and will help to manage the disease and create awareness for prevention of other metabolic syndromes in later part of life.

Pre intervention knowledge score showed that equal number of subjects had knowledge about diagnosis and symptoms (20%), followed by meaning, treatment and dietary management (13.33%) and very few had knowledge about causes and complications (6.66%) associated with disease. But after intervention there was increase in knowledge of women about all the aspects of disease. Maximum increase was found in knowledge about symptoms (80%), followed by complications, (73.34%) and treatment (73.33%).

Furthermore, the management of PCOS seemed to be inconsistent between different physician groups. Considering these and other findings internationally, doctors need more information and education on PCOS. For universal diagnosis and treatment of PCOS, the recently published international PCOS guidelines are well needed and welcomed. Future efforts should be made to increase the awareness of the guidelines and to promote implementation into practice.

Polycystic ovary syndrome (PCOS) is among the most common endocrine disorders and a major cause of anovulatory infertility in women of reproductive age (15–49 years) (Szilágyi and Szabó, 2003; Balen *et al.*, 2016). Globally, the estimated prevalence of PCOS ranges between 5% and 15% (Azziz, 2016). Compelling evidence suggests that women with PCOS have significantly higher risks of obesity, dyslipidemia, impaired glucose tolerance, and long-term complications such as diabetes, endometrial cancer, and cardiovascular disease (Lim *et al.*, 2012; Wild 2012; Peigné and Dewailly, 2014).

Previous efforts to monitor the PCOS epidemic have focused mainly on reporting the prevalence of disease (Yildiz *et al.*, 2012; Ding *et al.*, 2017; Wolf *et al.*, 2018). However, the annual incidence of PCOS, defined as the rate of new cases per year, provides a better reflection of the epidemiological changes associated with this disease (Guang, 2009). The disability-adjusted life-years (DALYs), a comprehensive measurement of premature mortality and disability, are an advantageous measure that can be compared directly across geographical areas (Capone, 2019).

Globally, the age-standardized prevalence of infertility and associated DALYs among women increased by 0.370% and 0.396% per year, respectively, from 1990 to 2017 (Sun *et al.*, 2019). As PCOS is the most common cause of anovulatory infertility in women (Balen *et al.*, 2016), a better understanding of the current burden of PCOS is essential for the primary prevention of infertility.

5.1 STRENGTHS AND LIMITATIONS:

5.1.1 STRENGTHS:

This study included participants belonging to a wide range age groups, comprehensive diet and PCOS counselling based on their baseline knowledge and practices irrespective of the duration of study and it has fofund significant association with nutritional education intervention.Our main outocme measure was designed for use in eating disorders leading toward unhealthy body.also we realizd that PCOS is prevalent in both young and aged women.The tool used to collect data was highly reliable,responsive to intervention since it was easy to apprehend and repond, has been designed to check the impact of nutritional eduvation intervention on knwoledge and practices of PCOS patients as well as to provide a tool to determine the effectiveness of nutritional education interventions , thus fulfiling the concept knwoledge and practices of patients can be improved through interventions. Data can be generalized because most of tareted population was included in study.With aid of nutritionist/Dietitian , PCOS symptoms can be improved.It also permits to upgrade and extend nutritionist practice.It provides insight to tertiary care hospitals for setting up separate nutritionist consultation room.

5.1.2 LIMITATIONS:

- Small sample size because of specific criteria restricting our participants selection and small duration of research project.
- Study had low response rate.
- We did not included a comparison group.
- We did not considerd patients perspective toward my counselling.
- The follow up period for evaluation of impact on knowledge and practices of PCOS women was one month which is shorter as compared to other studies.
- Patients included were suffering from multiple chronic diseases.
- Research was only conducted in tertiary hospital further can be done in comparison of two hopsitals.

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CHAPTER VI:CONCLUSION

Basline knowledge and practices about diet for PCOS of patients is assesed. The impact of education intervention showed significant improvement in the knowledge and practices of patients. Hence nutrition education intervention is effective and showed improvement in knowledge and practices of women with PCOS and will help to manage the disease and create awareness for prevention of other metabolic syndromes in later part of life. after intervention there was increase in knowledge of women about all the aspects of disease.

A significant association is found between area wise impact on PCOS patients knowledge and practices. Married women should significant difference than adolscent age group. As per education level women of Master degree level showed more significant difference than illiterate.

CHAPTER VII: RECOMMENDATIONS

Overall, this study implies that efforts should be made to improve patients knwoledge and practices towards healthy eating.Proper dietary counselling for diseases can transform a patIent's life. The impact of education intervention showed significant improvement in the knowledge and practices of patients. Hence nutrition education intervention is effective and showed improvement in knowledge and practices of women with PCOS and will help to manage the d

isease and create awareness for prevention of other metabolic syndromes in later part of life.

Future mixed-methods research could elicit additional insight on areas of improvement. Future research should explore the role of age-specific support groups in the management of PCOS and the benefits of health professional-led support groups. A list of current international English-speaking PCOS online support groups is made available by Avery et al. 2022. More research is needed to understand the lived experiences and needed healthcare services for individuals of various social identities and backgrounds; there is a lack of research in culturally- and gender-sensitive standards of care for PCOS . Studies analyzing media content on PCOS can help researchers, patients, and stakeholders address stigma and engage with the media to increase public awareness of PCOS .

7.1 WAY FROWARD:

There was a a significant difference on knowledge and practices of PCOS patients after intervention hence there is a need of proper counselling and consultation office in atleast tertiary care hospitals so that patient can better understand lifestyle modifications to improve quality of life.The follow up period was one mont to evaluate the impact of intervention given by nutritionist but it needs to be more for better outcomes,future researchers should extend therir follow up to 5 monts.Patients included in this study were suffering from other chronc issues too , furture studies should focus on one specifis disease to evaluate the impact of nutritional education intervention. Future researchers should formulate tool eith minimum domains to save time.

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Appendix A

Questionnaire

Impact of a nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Rawalpindi city: A Quasi-Experimental study

A. Socio-Demographics

1. What is the current status of the relationship?
    1. Single
    2. Married
    3. Separated
    4. Widowed
2. Is the person from urban area or rural area?
    1. Urban
    2. Rural
3. What is your age?
    1. 18-25
    2. 25-35
    3. 35-50
    4. Above 50
4. What is your gender?
    1. Male
    2. Female
    3. Others
5. Are you a permanent resident of district Sialkot?
    1. Yes
    2. No
6. What is your education?
    1. ILLITERATE
    2. High School
    3. Bachelor's Degree
    4. Master's Degree

7. Are you employed?
    1. Yes
    2. No
8. 8. Are you suffering from any medical condition?
    1. Yes
    2. **No**

B. Knowledge of PCOS used Polycystic Ovarian Syndrome Questionnaire- PCOSQ (Cronin et al., 1998)

9. Do you have any knowledge about polycystic ovarian syndrome?
    1. Yes
    2. No
10. What is your feeling after hearing the result and reaction of having PCOS?
    1. Depressed or gloomy
    2. Feeling tired and down
    3. Trouble while sleeping
    4. Happy
11. Does there is excessive growth of hairs on the body and it's visible all over the chin or face?
    1. A little amount of growth of the hair on the chin
    2. Growth of hair is visible over hands
    3. No growth
    4. Abnormal growth of hairs over the chin
12. Are you worried about being overweight
    1. Not really
    2. Yes I am very much concerned about my weight gain
    3. No, I am happy about my weight gain
    4. May be
13. Are you facing abdominal menstrual periods cramps
    1. Yes
    2. No
    3. No, not at all
14. Are you concerned and afraid about infertility problems?
    1. Yes
    2. No

3. May be
4. No, not at all

C. Clinical PCOS's history

15. Do you have hyper and rogenism?
    1. Yes
    2. No
16. Do you have polycystic ovaries?
    1. Yes
    2. No
17. Do you have oligomenorrhea?
    1. Yes
    2. No
18. Do you have Hirsutism?
    1. Yes
    2. No
19. Do you have cystic acne before and after menstrual cycle?
    1. Yes
    2. No
20. Have you ever felt hysteria and depression?
    1. Yes
    2. No
21. Do you have growth of visible hair on face?
    1. Yes
    2. No
22. Do you have growth of visible hair on abdomen or body?
    1. Yes
    2. No
23. Have you had menstrual periods with clots?
    1. Yes
    2. No
24. Do you have children?
    1. Yes
    2. No
25. Do you have history of oligomenorrhea / amenorrhea?

1. Yes
2. No

D. Knowledge about PCOS & Dietary habits

26. Do you know you can be infertile due to PCOS?
    1. Yes
    2. No
27. Do you know PCOS is influenced by diet?
    1. Yes
    2. No
28. Do you follow any specific diet plan for PCOS?
    1. Yes
    2. No
29. Do you know about the problems of disease?
    1. Yes
    2. No
30. Do you know about the method of treatment?
    1. Yes
    2. No
31. What Treatment method do you know is best?
    1. Cystectomy
    2. B. Injectable
    3. C. Dietary Management
    4. D. No One
32. What is your source of knowledge?
    1. Friends
    2. Social Media
    3. Health Education
    4. Others

E. Practices and about healthy eating

33. Have you undergone an ultrasound test?
    1. Yes
    2. No
34. Have you undergone hormonal test?
    1. Yes

2. No

35. Do you follow a diet plan?
    1. Yes
    2. No

F. Attitudes about healthy eating

36. Do you eat junk?
    1. Yes
    2. No
37. Do you take supplements?
    1. Yes
    2. No

G. Nutritional practices by eating habits questionnaire-EHQ (Edy Susanto, 2019)

38. What breakfast do you take in the morning?
    1. Cereal
    2. Bread butter
    3. Boiled egg
    4. Do not take a breakfast
39. How much per cent do you think management is interested in telling the people they should eat healthily?
    1. 70%
    2. 20%
    3. 40%
    4. 50%
40. What dairy foods does a doctor or nutritionist recommend to people they should drink?
    1. Full fat milk
    2. Skimmed milk
    3. Avoid all dairy foods
    4. A mixture of both kinds of milk full fat and skimmed milk
41. Does the doctor or nutritionist recommend to you any vitamins that you should take every week?

1. Yes
2. No

42. How many teaspoons of sugar do you intake in beverages and foods in a day?
    1. 2-3 tablespoon
    2. 1-2 teaspoon
    3. 1 tablespoon
    4. No sugar

H. General Health

43. What is your BMI after Polycystic Ovarian Syndrome?
    1. less than 19.5
    2. 19.5 to 24.9
    3. more than 25
    4. more than 30

44. Are you overweight?
    1. Yes
    2. No

45. What is your current Weight?
    1. More than 50 kg
    2. Less than 45 kg
    3. More than 60 kg

46. What is your current Blood Pressure?
    1. Less than 120
    2. Higher than 180
    3. 130-140
    4. 120-129

47. Does Polycystic Ovarian Syndrome affect BMI?
    1. Yes
    2.

Appendix B

INFORMED CONSENT

Title of study:

Impact of nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Rawalpindi city: A Quasi-Experimental study

Researcher:

Kainat Saleem. MSPH student, Al Shifa School of public health Rawalpindi.

Purpose:

The international clinical practice guidelines for PCOS emphasize diet and exercise as first-line management of clinical signs and symptoms. This study aimed to check Impact of nutritional education intervention on knowledge and practices of women with polycystic ovarian syndrome visiting Tertiary hospital of Rawalpindi city: A Quasi-Experimental study

Procedure:

In this study, you will fill adapted questionnaire containing 48 questions. Your identity ‘ll be kept anonymous. You have to fill questionnaire 2 time with a gap of 15 days.

Time Required:

It is anticipated that it will take approximately 15 minutes of your time to complete the survey.

Voluntary Participation:

Participation in this study is voluntary. You have the right to not open or complete the anonymous survey

Confidentiality:

Data from the surveys will be completely anonymous and reported in aggregate form. Your name will not be collected at any time. After data collection, the interview and demographic responses will be password-protected. Once submitted the researcher will not be able to withdraw responses due to anonymity and de-identified data.

Risks:

While the research survey poses minimal risk there is a risk of loss of confidentiality to participants. There are no anticipated risks in this study.

Benefits:

There are no direct benefits associated with participation in this study the potential benefit from this research is to to study and investigate possible association between dietary pattern and risk of PCOS.To

Understand PCOS women lifestyle coping strategies, and challenges while dealing with PCOS symptoms. To suggest dietary interventions for PCOS and to understand how diet can deal with PCOS clinical symptoms.

Payment:

You will receive no payment for participating in the study.

Right to withdraw from study:

You have the right to withdraw from the study at any time before submitting the survey without penalty.

If you have questions about the study, contact the following individual:

Kainat Saleem

Kainats855@gmail.com

Contact # 03342215543

CONSENT

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

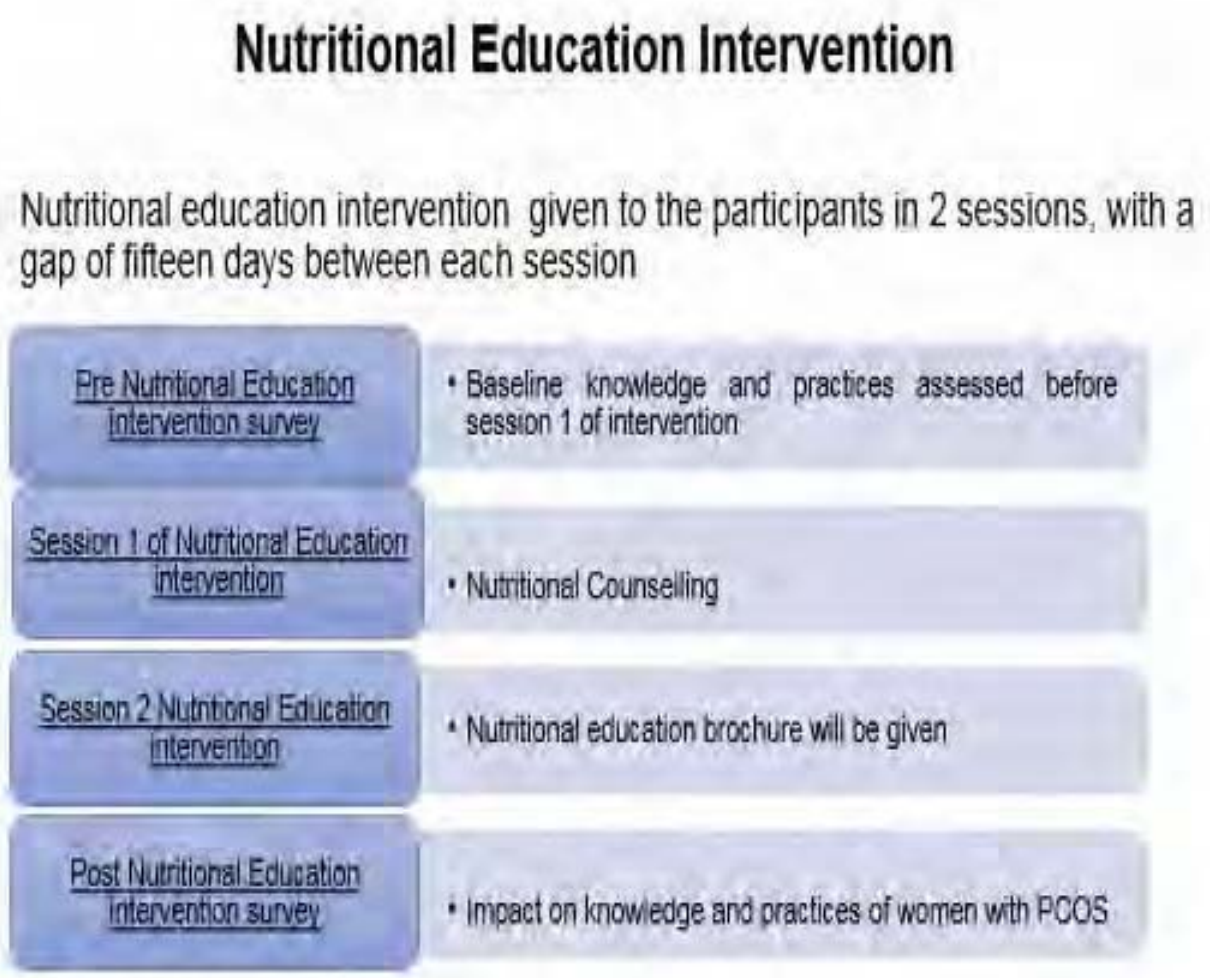
Name of Participant_____

Signature of Participant _____

Date _____ DD/MM/YY

Appendix C

Nutritional Education Interventions



BROCHURE

Counselling

Nutritional Education Interventions

Counselling is used as an interface to educate and create awareness among the participants in the study. The level of the impact on knowledge and practices was measured using a questionnaire at the beginning and end of nutritional education intervention. The participants were recruited during their hospital visits. The participants during their visit are explained with the purpose of the study and an informed consent was made as a necessary step to recruit the participants.

Counselling about Knowledge of polycystic ovarian syndrome

multidisciplinary approach, involving gynecologists, endocrinologists, primary healthcare providers, mental health professionals, and nutritional professionals, especially dietitians, is fundamental to provide an immediate care and to counteract long-term risk factors related to the comorbidity of PCOS.Polycystic ovary syndrome (PCOS) is an extremely heterogeneous condition and tha

Although lifestyle modifications are the first step intervention in the treatment of PCOS, unfortunately, the involvement of dietitian in clinical practice remains sporadic. The goal of this viewpoint is to put a greater emphasis on the role of dietitian in the management of PCOS by highlighting frequently faced difficulties in the clinical settings and the importance of a three-step nutritional care: accurate assessment; lifestyle, nutritional, and supplementary intervention; long-term follow-up. The intention is to raise awareness among dietitians themselves and other health providers as well as to express an exceeding necessity of evidence-based guidelines formulated specifically for nutritional professionals, which would allow a uniform approach with respect to heterogeneity and complexity of PCOS at the international level.

Counselling about diet for polycystic ovarian syndrome Women

Subjects were recommended a self-selected diet of 1,500–1,800 kcal/d of conventional foods based on the Food Guide Pyramid and an exercise goal starting at 50 minutes per week and increasing to 175 minutes per week. Counseling included standard weight loss skills including self-monitoring, problem-solving, enlisting social support, and overcoming negative thoughts.

A healthy, balanced diet will help to reduce and manage some of the symptoms of polycystic ovary syndrome and can assist with weight management, helping to regulate insulin levels. Finding the right diet to tackle the symptoms of PCOS can be a complex process and needs to be tailored to each person's symptoms and lifestyle. Contacting a suitably qualified nutrition professional will help you understand and manage the dietary and lifestyle change

Does your weight make a difference?

Weight gain is one of the most common side effects of PCOS. Whilst it is essential that women with PCOS seek professional medical advice and treatment for the condition, a nutrition professional could provide individuals with extra support if they are struggling to manage their PCOS diet independently.

According to the NHS, individuals losing just 5% of their body weight will experience an improvement in symptoms of polycystic ovary syndrome.

Following a low GI (glycaemic index) diet

The glycaemic index is a way to monitor how quickly the blood glucose rises after eating carbohydrates. Foods with a low GI can cause your blood levels to rise slowly, and it's thought that these are helpful in reducing the symptoms of PCOS.

Low GI foods can improve and help balance insulin levels; women with PCOS are often resistant to the effects of insulin, therefore, they have more insulin in their blood. This rise in insulin levels means the levels of testosterone are also increased. The increase in both insulin and testosterone upsets the natural hormone balance in the body, which can cause symptoms to flare up.

Women with the condition may find replacing high GI foods effective, even if they do not need to lose weight. It has also been found that, when combined with weight-loss, a low GI diet can help regulate the menstrual cycle.

As well as the potential to help ease some of the symptoms worsened by being overweight, a balanced, nutritious diet will also help to reduce a woman's risk of developing diabetes and heart disease as well as improve overall health and well-being.

Foods typically included in a PCOS diet

Healthy fats - Unsaturated fats are essential in managing the symptoms of polycystic ovary syndrome. Essential fatty acids (EFAs) are vital in a PCOS diet as they help maintain the cell wall, which absorbs the nutrients we need. EFAs also help to rebalance hormones, manage weight and can help fertility. 'Healthy' fats can include oily fish (salmon or mackerel), avocado and olive oil.

Magnesium-rich foods are also important to include, as a deficiency in magnesium has recently been linked with an increased risk of insulin resistance. Dark, leafy greens, nuts and seeds can help provide you with the mineral.

Organic meat - It is helpful to eat good quality, lean meat if you suffer from PCOS. Grass-fed meat often contains fewer hormones and the livestock is less likely to have been fed genetically modified foods. The GM foods fed to standard livestock will often contain pesticides, if consumed, it can be more difficult to manage hormone levels and treat symptoms of PCOS.

In addition to organic meat, organic dairy products, best in the form of live, natural yoghurt, (rather than cheese or milk) are advised as it contains bacteria beneficial in a diet for PCOS.

Fruit - Fruit is rich in fibre and is a good source of essential vitamins and minerals. Whilst many women are reluctant to add fruits into their PCOS diet due to the sugar content when eaten, in the correct portions and as a whole, fresh fruit (as opposed to dried or juiced) can be an extremely healthy alternative to ready-made, high-sugar snacks. Fruit is vital in providing the body with the nutrients needed to combat the symptoms of PCOS.

Fruits with a low GI include cherries, plums, apricots, prunes and grapes.

If concerned about the rise in blood sugar and insulin levels caused by fruit, enjoy a handful of seeds or nuts as a side snack - the protein in the seeds can help regulate the rising glucose levels. Aim for two to three portions of fruit per day and increase your vegetable intake for fibre, minerals and antioxidants.

Chromium is an important mineral involved in regulating blood sugar and insulin levels. This can sometimes be low in a highly refined diet; opting for more complex carbohydrates, such as whole grains, broccoli and nuts can help to provide this.

Pregnancy - If you are trying to get pregnant, it is particularly important to consider whether you are getting the right amount of nutrients in your PCOS diet. For support and advice on following a healthy PCOS diet for pregnancy, please consult your GP or a suitably qualified professional.

It has been found that the sex hormone-binding globulin (SHBG) is usually low in women with PCOS. Lignans, found in flax and sesame seeds, chickpeas and carrots are reported to increase this.

Knowledge about Diagnosing PCOS

PCOS is usually diagnosed by your GP or healthcare provider. They will carry out blood tests at a suitable time during the menstrual cycle to determine whether or not you are affected.

Once the diagnosis has been made, options for management can then be discussed. If treatment is needed, your GP or specialist may prescribe you medication and/or may recommend certain lifestyle changes.

For more complicated cases, you may be referred to a professional specialising in female reproductive health, such as a gynaecologist or endocrinologist.

Symptoms of polycystic ovary syndrome

Women will commonly begin to notice symptoms of polycystic ovary syndrome between their late teens and early 20s. Not all the PCOS symptoms will occur in all sufferers; for example, some women may experience extremely irregular periods, whereas others may have normal cycles but find excess body hair.

Some sufferers will experience mild symptoms, while others may suffer more than one, these can include:

- Absent or irregular periods.
- Acne, usually on the face.
- Thinning hair.
- Excess body hair on the face, forearms, lower legs, around the nipples and lower abdomen - this is known as hirsutism.
- Weight gain - this is common in women with the condition. Cells are resistant to the insulin controlling sugar levels, this means the sugar isn’t used properly and is stored as fat instead.

- Miscarriage - women suffering PCOS usually have a raised level of the luteinising hormone. Sufferers with high levels of this stand a 65 per cent increased risk of pregnancy resulting in miscarriage.

Long-term risks of PCOS

Polycystic ovary syndrome can, over time, increase the risks of developing health problems later in life. PCOS is also a common cause for female infertility - with many women discovering the condition when trying to conceive.

Women with PCOS are at an increased risk of developing:

- type 2 diabetes
- sleep apnoea
- high blood pressure
- high cholesterol
- mood swings
- depression

Counselling about Practices and healthy Eating Habits for PCOS

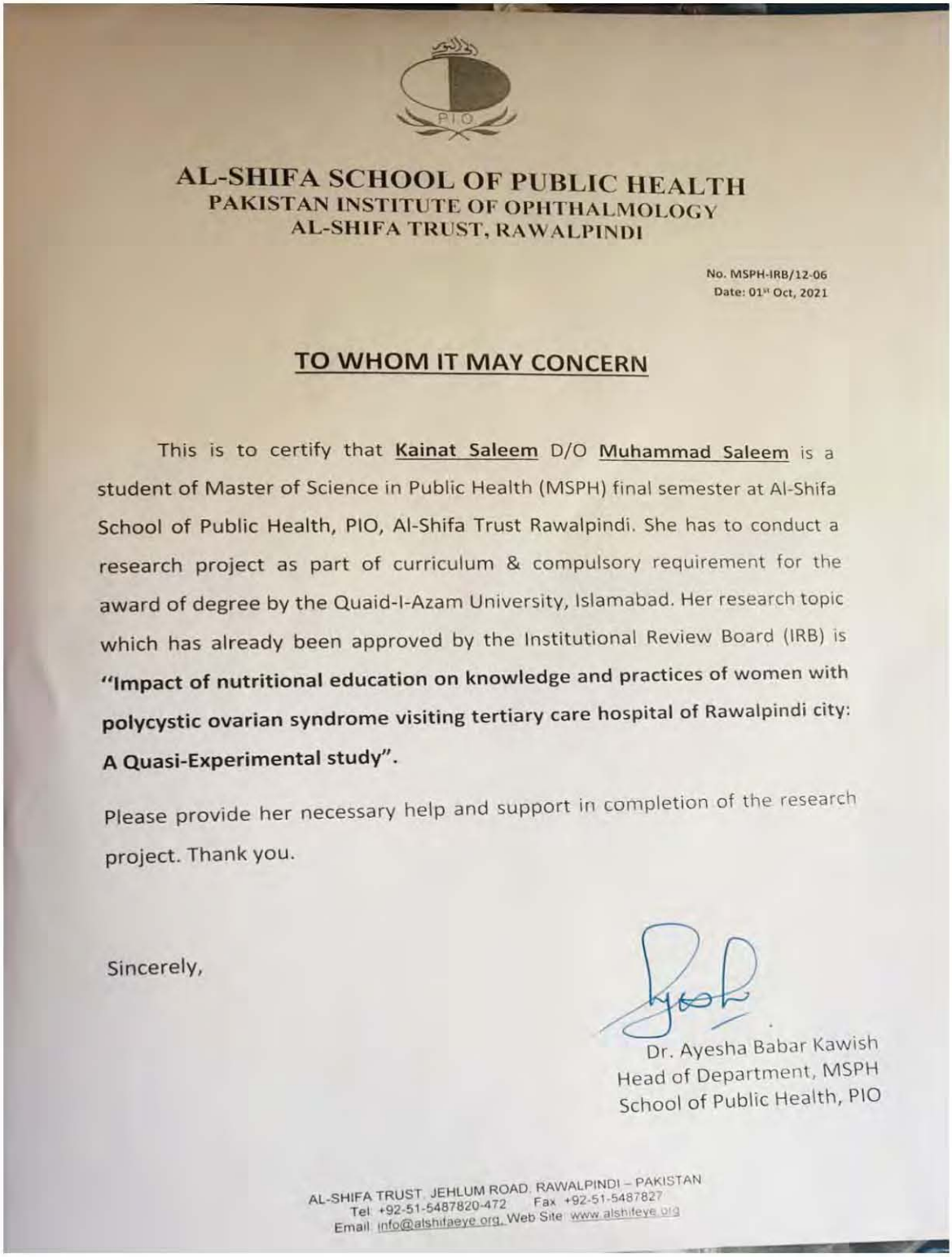
- A healthy diet helps to protect against malnutrition in all its forms, as well as noncommunicable diseases (NCDs), including such as diabetes, heart disease, stroke and cancer.
- Unhealthy diet and lack of physical activity are leading global risks to health.

Eating a healthy diet helps protect against all forms of malnutrition and non-communicable diseases (NCDs) such as diabetes, heart disease, stroke and cancer. Unhealthy diet and lack of exercise are the greatest health risks in the world. Healthy eating habits begin early in life-breastfeeding promotes healthy growth, improves cognitive development, and may have long-term health benefits such as: B. Reduce the risk of developing NCD in later years by becoming overweight or obese. Energy intake (calories) should be balanced with energy expenditure. To avoid unhealthy weight gain, total fat should not exceed 30% of total energy intake . Saturated

fat intake should be less than 10% of total energy intake and trans fat intake should be less than 1% of total energy intake. Fat consumption shifts from saturated and trans fats to unsaturated fats and is processed towards the target. Fat Trans Eliminates fat. Limiting your free sugar intake to less than 10% of your total energy intake is part of a healthy diet. Further reductions to less than 5% of total energy intake have been proposed for additional health benefits. A daily salt intake of less than 5 g (equivalent to a daily sodium intake of less than 2 g) helps prevent high blood pressure and reduce the risk of heart disease and stroke in the adult population. WHO member countries have agreed to reduce the salt intake of the world's population by 30% by 2025. They also agreed to stop the increase in diabetes and obesity in adults and adolescents, and the increase in childhood obesity by 2025. overview Eating a healthy diet throughout your life course can prevent all forms of malnutrition and various non-communicable diseases (NCDs) and symptoms. However, eating habits are changing due to increased production of processed foods, rapid urbanization, and lifestyle changes. Today, people consume foods high in energy, fat, free sugar, salt / sodium, and many do not eat enough fruits, vegetables, and other fibers such as whole grains. The exact composition of a diverse, balanced and healthy diet depends on individual characteristics (age, gender, lifestyle, level of physical activity, etc.), cultural background, locally available foods, and diet. .. However, the basic principles of a healthy diet remain the same. For adults A healthy diet includes: Fruits, vegetables, legumes (lentils, beans, etc.), nuts, whole grains (raw corn, millet, oat, wheat, brown rice, etc.). At least 400g (equivalent to 5 servings) of fruit and vegetables per day, excluding potatoes, sweet potatoes, cassava and other starchy roots. Less than 10% of total energy intake from free sugar. This is equivalent to 50g (or about 12 levels of teaspoon) for a healthy weight person who burns about 2000 calories per day, but ideally total energy for additional health needs. (WHO , 2015)

Annexure D

IRB approval letter



AL-SHIFA SCHOOL OF PUBLIC HEALTH
PAKISTAN INSTITUTE OF OPHTHALMOLOGY
AL-SHIFA TRUST, RAWALPINDI

No. MSPH-IRB/12-06
Date: 01st Oct, 2021

TO WHOM IT MAY CONCERN

This is to certify that **Kainat Saleem** D/O **Muhammad Saleem** is a student of Master of Science in Public Health (MSPH) final semester at Al-Shifa School of Public Health, PIO, Al-Shifa Trust Rawalpindi. She has to conduct a research project as part of curriculum & compulsory requirement for the award of degree by the Quaid-I-Azam University, Islamabad. Her research topic which has already been approved by the Institutional Review Board (IRB) is **"Impact of nutritional education on knowledge and practices of women with polycystic ovarian syndrome visiting tertiary care hospital of Rawalpindi city: A Quasi-Experimental study".**

Please provide her necessary help and support in completion of the research project. Thank you.

Sincerely,

Dr. Ayesha Babar Kawish
Head of Department, MSPH
School of Public Health, PIO

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