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# ICT ENABLED EDUCATIONAL MODULE ON ANAEMIA AND PCOD OF ADOLESCENT GIRL- DEVELOPMENT AND IMPACT ASSESSMENT

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## ABSTRACT

The reproductive health (RH) of a girl involves a continuous transfer of healthy biology to the future generations. The RH of a girl actively starts from their Menstruation ( periods) as it is the beginning stage of the reproductive life or fertility. So, the reproductive health means not merelythe absence of disease or disability in reproductive system, its functions and processes. Anemia inwomen of reproductive age has a tremendous effect on the women. there were no reports on influence of education trainings on KAP levels in both anemia and PCOD together. Hence, first time the present study made an attempt to assess KAP levels in anemia and PCOD of adolescent girls suffering from PCOD with anemia in selected location. An ICT enabled tailored educational module was developed depends on the gap between basic knowledge and required knowledge of adolescent girls and the impact of awareness training programme using ICT enabled tailored educational health module on knowledge of two RH concerns was assessed. It was concluded from the present study that there was a significant increase in KAP levels of girls in anemia and PCOD after training by developed tailored module. Hence, the steps to be adopted and strengthened by government for displaying various modules in schools and pre university colleges for enhancing attitudes and practices towards two RH challenges for further creation of healthy future generation.

**Keywords*: Reproductive* health, anemia, PCOD, education module**

## INTRODUCTION

A state of complete physical, mental and social well being of a girl is very important in their life. In specific, reproductive health (RH) involves a continuous transfer of healthy biology to the future generations too. Adolescents are young people between the age of 12 & 19years **[1]** and areto be focused more as it is a period of rapid physical growth, sexual, physiological and psychological changes. The habits and behaviour started during adolescence have lifelong impact **[2]**. Especially in girls, it affects the RH in adulthood which have their roots in adolescence. The RH of a girl actively starts from their menstruation (periods) as it is the beginning stage of the reproductive life or fertility. The Common Reproductive Health (RH) concerns include Endometriosis, Uterine Fibroids, Interstitial Cystitis, Polycystic Ovarian Disease (PCOD), Anemia, Sexually Transmitted Diseases (STDs), Sexual Violence etc. Among these, **PCOD** is one of the common endocrine conditions in women of reproductive age **[3, 4]**, where the ovaries produce multiple immature eggs which over time become cysts on the ovaries. Along with havoc in female hormonal control, ovaries release abnormal amounts of androgens (male hormones) or lead to infertility **[5]**. This hormonal breakdown results in irregular or prolonged menstrual periodswhich may lead to anemia. The prevalence of PCOD is around 9-22% of Indian women. Women with PCOD who become pregnant are at higher risk than those without PCOD of developing gestational diabetes mellitus or suffering from a first-trimester spontaneous abortion **[6, 7]**. Thus, PCOD constitutes a significant health and economic burden **[8, 9]**. **Anaemia** is a condition in which the number of red blood cells or the haemoglobin concentration is lower than normal. Anemia is considered as an indicator for nutrition and health status of an adolescent **[10]**. Anemia in women of reproductive age has a tremendous effect on the women such as loss of productivity due to reduced work capacity, cognitive impairment, increased susceptibility to infections due to its effect in immunity, still birth/miscarriage, and maternal mortality **[11]**. Now a days majority of adolescents are suffering from PCOD with anemia. The main causes for the two RH challenges (Anemia, PCOD) are mal nutrition (iron deficient diet) and modified life styles like the junk foodconsumption tendency, lack of exercise etc. **[12]**. And these two RH concerns (Anemia, PCOD) play major role in adolescent girls **[13]**

which can be mitigated with proper awareness trainings and life style modifications along with the provision of highly nutritious food during their adolescent age in particular in rural areas. Hence, a study on Knowledge, Attitudes and Practices (KAP) of adolescent girls regarding

prevention of anaemia, PCOD is essential to reduce a common public health burden **[14, 15]** which otherwise leading to increased morbidity and mortality especially in adolescent girls who are future mothers **[16]**. There is a need to reduce the burden of PCOD associated with anaemia among adolescent girls by implementation of health programs like training or awareness programs using various advanced modules designed for the growth and development of a good reproductive health in adolescent girls.

There were number of studies conducted related to KAP levels and impact of education trainingsin either anemia or in PCOD separately **[17, 18]**. But, there were no reports on influence of education trainings on KAP levels in both anemia and PCOD together. Hence, first time the present study made an attempt to assess KAP levels in anemia and PCOD of adolescent girls suffering from PCOD with anemia in selected location along with the assessment of impact of awareness trainingprogramme using ICT enabled tailored educational health module on knowledge of two RH concerns. The main objectives of study were:

1. To assess the Knowledge (on causes, prevention, cure along with the consequent side effects with medical treatment) levels regarding the Reproductive health with respect to PCOD & Anaemia in selected rural areas.
2. To find out the gap between assessed KAP & required KAP to design and develop an ICT enabled tailored Educational module.
3. To conduct awareness trainings using the developed module to selected adolescent Girls (Experimental group).
4. To assess the impact of the developed module on KAP levels of adolescent girls.
5. To assess the relationship between Socio demographic variables of subjects with their KAP levels.

**MATERIALS AND METHODS:**

A descriptive design was selected to assess KAP levels to accomplish the objectives and considering the feasibility. The present study design chosen was an

equivalent pre-test - post test, control group design **[19]**, that included 36 Experimental and 36 control group with an evaluative approach. thus total sample was 72 and its convenient purposive sampling design. The sample selected were Adolescent girls residing in rural areas around Tirupati and Chandragiri, Andhra Pradesh, India and studying in nearby colleges and staying in hostels of age between 12- 19 years. The study was conducted in four phases

**Phase 1: Pre-test and Questionnaire preparation**

This study was conducted with approval from the Human Ethics Committee of the University. Allparticipants were informed about the purpose of the study and took their written consent for voluntary participation in colleges after taking approval from the head of the institution for selecting samples who possessed PCOD with anemia symptoms and diagnosed.

The tool (a structured Questionnaire) was prepared for measuring basic KAP levels of selected adolescent girls in anemia & PCOD. The questionnaire was consisted of 4 parts with different variables regarding socio demographic details (Part 1), Knowledge about anemia (Part 2A), PCOD (Part 2B), attitude (Part 3) and practices (part4) to control anemia and PCOD as shown in **Table 1**. Itwas validated by the concern expert (medical officer) **[20]**.

After selection of study sample, a Pre- test was conducted to assess the base line knowledge regarding the reproductive health (Anemia, PCOD) of adolescent girls residing in and around Tirupati by the prepared questionnaire. It helped to find the basic KAP levels of selected total sample (72) for further development of training module. Then the sample was divided into two groups as control group and experiment group each containing 36 participants **[21]**.

**Phase 2: Development and use of ICT module**

Now a days, the young generations are more attractive towards technology driven self learning methods using mobiles or computers which help them ease of carrying, storing, handling and using at any time in any place. Hence, an ICT module was chosen to provide awareness along with the required knowledge, practices to control and prevent two major RH challenges of adolescent girls (anaemia and PCOD). In this module, a "mobile app" was developed with two languages both in telugu (local language) and english in audio and visual modes. The module provided the information which was approved by expert regarding both RH challenges, included symptoms

of diseases, general diagnosis methods, treatment procedures, the best practices to control and prevent anemia and PCOD by life style management using diet, exercise, yoga and psycho social concerns. The audio visual modes were previously recorded by the team of investigators during study for development of "an app" as ICT module as per the objective of study by using Python and Java language. It can be operated by installing the app in any android mobile or connecting to laptops. So, that in all colleges or schools it can be played for providing knowledge as a part of health education.

The training program was administered to experimental group using the developed app (ICT module) to educate and improve the KAP levels for early identification of symptoms of anemia and PCOD to control and improve the health from anemia & PCOD.

**Phase 3: Post test**

After one month the post-test was conducted by the same questionnaire to both groups without administration of the training to control group and with administration of training program by module to experimental group.

**Phase 4: Data analysis**

Then the data collected in pre test was tabulated and analysed first for determination of distribution of total sample (72) with regard to age, BMI (Calculated with standard formula based on height and weight), socio economic (SE) levels, anemia levels, basic (pre-test) KAP levels **(Table 2)**. The SE levels were grouped based on revised Kuppuswamy socioeconomic slate scale, 2017. The BMI was calculated for al and levels of BMI were categorised as given in **Table 2** as per "Asian cut off " BMI scales. The anemia levels were noted as in **Table 2** based on guidelines given by National Cancer Institute. The Knowledge levels were identified as per a scale shown in **Table 2**. The distribution pattern of total sample as per variables is shown in **Table 3**. The association between age group and BMI, Anemia and total score **(Table 4)** was assessed. The association between SE levels and BMI, Anemia and total score was also assessed **(Table 5)** by statistical methods.

The KAP levels were also determined for two groups in post test then, scores of pretest and post test were compared in both the groups. The knowledge scores (mean values) calculated separately in anemia and PCOD too.

**Statistical analysis**: SPSS Software (version) was used for data analysis. Normally distributed data for continuous variables were analyzed using means and standard deviations; whereas, non-

normally distributed data were expressed as percentages **[22]**. Paired t-test was conducted to analyze the statistical significance of the differences in the means and percentages of sample in various levels of knowledge in pre and post tests. Chi square test was conducted to evaluate the statistical significant association of data with age and socio economic levels of sample with BMI levels, anemia levels, and knowledge levels **(Table 4 & 5)**.

**RESULTS AND DISCUSSION:**

As per table 3, the distribution of sample indicated the highest % (26-27%) participants were age of 16 and 17yrs. **(Figure 1)** with SE level of UL of 53.5%. 43.4% of participants were with moderate anemia and 36.4% were with severe anemia. The BMI levels of participants confirmed that the highest % (48.6%) were in normal healthy level. The percentage of girls in different levels of KAP in pretest were calculated based on the score attained by them. In total, 53% of them were at poor, 46% were at fair and 1% were at good level of knowledge **(Table 3)**.

The association between age and BMI, anemia and basic KAP levels (pre test) of participants depicted in table 4 has shown that at age of 19yrs, more (8.4%) were in mal nutrition/under weight level and 15.4% were healthy at 16 and 17 yrs of age. As per anemia levels **(table 4)** significantly more (22.4%) participants were in severe level at age of 16yrs. Similarly the highest (16.8)% were at poor level of knowledge at 16yrs of age. Among 15 to18yrs age group, the least (2.8%) knowledge level was found at 15yrs and highest and same (11.2) % knowledge level was found between 16-18yrs. The association between SE status and BMI, anemia and basic KAP levels of participants given in table 5 revealed that the highest % (17.1%) of under weight and (22.8%) normal were in UL level. The highest (28.5%) participants of severe anemia were found in UL level. The highest (32.5%) poor KAP level were in UL level of SE status.

The mean score was calculated for individual parts of questionnaire in both groups in pre and posttests as shown in **Table 6**. As per the table 6, the highest knowledge was noted in part 2A (anemia) with mean value of 3.8 than in 2B (PCOD). The comparison of mean scores and knowledge levelsin different parts of questionnaire revealed that the part 2A (in anemia) has the highest (37.8)% were at fair level with a mean score of 3.45 whereas in PCOD (part 2B) the highest (67.5) % werein poor level with a mean score of 1.15. It demonstrated that the

basic knowledge of girls was significantly less ($p<0.01$) in PCOD than in Anemia. The levels and mean scores in part 3 (Attitude) and part 4 (Practices) were compared, there was a significantly more girls were at poor level with significantly less ($P<0.01$) mean scores in practice (part4) than in part 3. It demonstrated that the girls need more practices to manage anemia and PCOD.

Then these levels and mean scores were also compared in pretest and post test results in two groups **(Table 6)**. It confirmed that there was a significant ($P<0.01$) improvement in mean scores in post test compared to pre test in experimental group, whereas there was no significant change in pre and post test results of control group. Further the results demonstrated that there was a significant increase in total mean score value from 8.5 to 17.8 which shown that the value was doubled and proved the influence of training on enhancement of KAP levels. It was also found that there was significant increase in % of girls at "good" level from 3% to 67% in post test illustrated the impact of training by ICT module in the improvement of knowledge regarding the selected two RH challenges of adolescent girls.

In all subjects (parts) of questionnaire, it was found that there was significant increase in mean scores in post test of experimental group. There was tremendous increase in % of girls at "good " level in all subjects /parts like increase from 14 to 39.2% in anemia (part2 A) , 2.4% to 58.8% in PCOD (Part 2B) , from 11 to 36.4% in Attitude (Part 3) and 0% to 16.8% in Practices (part 4). It strongly suggested that the present study developed "ICT module" is significantly effective (paired t test) for improvement of KAP levels in anemia and PCOD among adolescent girls.

It was also observed from pre test, that the highest % (67%) of girls known about these two RH concerns from their teachers. 60% of girls felt symptoms of fatigue and 80% of girls suffering from irregular periods with dysmenorrhoea.

**Table 1: Study variables determined using structured questionnaire**

| S. No. | Name of variables |
|---|---|
| Part 1 | Socio demographic details |
| | Age |
| | height |
| | weight |
| | Menarche |
| | Cycle of periods (regular/irregular) |
| | Marital staus |
| | Social status |
| | Familys monthly income |
| Part 2 | Knowledge regarding Anemia and PCOD |
| 2A | *Regarding Anemia* |
| | Meaning of Anemia |
| | Cause of Anemia |
| | Normal Hb levels |
| | Iron rich foods |
| | Symptoms of anemia |
| | Preventive measures for anemia |
| | Treatment for anemia |
| | *Diagnostic test for anemia* |
| 2B | *Regarding PCOD* |
| | Meaning of PCOD |
| | Symptoms of PCOD |
| | Suitable food to avoid PCOD |
| | Preventive measures for PCOD |
| | Safe cure methods for PCOD |
| | Serious health challenge during PCOD |
| Part3 | Attitude of girls towards reproduction health (Anemia & PCOD) |
| | Maintenance of good hb levels |
| | Food habits<br>Menstrual hygiene |
| | Body weight control |
| | Regularity of periods |
| | Handling of menstrual challenges (dysmenorrhea, Amenorrhea) |
| Part 4 | Practices for maintenance of good reproductive health |
| | Diet intake |
| | Food to avoid for weight control |
| | Menstrual hygiene |

**Table 2: Scales for Different Parameters**

| S. No | Name of the Parameter | Scale | Name of Level | Reference |
|---|---|---|---|---|
| 1. | BMI | | | Asian cut off BMI classification in WHO Expert Consultation,2004 [23] |
| | | <18.5 | Mal Nutrition/Under weight | |
| | | 18.5-22.9 | Healthy/Normal | |
| | | 23-24.9 | Over weight | |
| | | ≥25 | Obese | |
| 2. | Anemia | | | Cappellini MD [24] |
| | | 10-12 | Mild | |
| | | 8-<10 | Moderate | |
| | | 6.5-<8 | Severe | |
| 3. | Socio Economic Status (Family income) | | | Majumder S Revised Kuppuswamy's SEstatus scale [25] |
| | | <5 | Lower (L) | |
| | | 5-10 | Upper lower(UL) | |
| | | 11-15 | Lower Middle (LM) | |
| | | 16-25 | Upper middle (UM) | |
| | | 26-29 | Upper (U) | |
| 4. | KAP scores | | | Likert scale [26] |
| | | 0-24% | Poor | |
| | | 25-54% | Fair | |
| | | 55-80% | Good | |
| | | >80% | Excellent | |

**Table 3: Distribution of Total Study sample**

| S. No. | Parameter | n | % | Remarks |
|---|---|---|---|---|
| 1. | Age in Years | | | |
| | 15 | 4 | 5.6 | |
| | 16 | 20 | 27.7 | Highest |
| | 17 | 19 | 26.5 | |
| | 18 | 15 | 20.8 | |
| | 19 | 14 | 19.4 | |
| 2. | SE levels* | | | |
| | L | 16 | 31 | |
| | UL | 28 | 53.5 | Highest |
| | LM | 5 | 9.5 | |
| | UM | 2 | 4 | |
| | U | 1 | 2 | |
| 3. | Anemia level | | | |
| | Mild | 15 | 20.8 | |
| | Moderate | 31 | 43.4 | highest |
| | Severe | 26 | 36.4 | |
| 4. | BMI level | | | |
| | Mal nutrition | 20 | 27.8 | |
| | Healthy/Normal | 35 | 48.6 | highest |
| | Over weight | 8 | 11.1 | |
| | Obese | 9 | 12.5 | |
| 5 | Basic Knowledge levels | | | |
| | Poor | 38 | 53 | highest |
| | Fair | 33 | 46 | |
| | Good | 1 | 1.4 | |
| | Excellent | - | - | |
| | Mean score in pre testof two groups | 8.65±3.8 | | |
| 6 | Mean score in Post testin Experimental group | 18.8±3.27 | | 2.2 times Increased |

**Table 4: Association of Age with BMI, Anemia and KAP levels**

| S. No | Age (Yrs.) | BMI (%) | | | | Anemia (%) | | | KAP levels (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mal nutrition | Healthy | Over weig ht | Obesity | Mild | Moderate | Severe | Poor | Fair | Good | Excellent |
| 1 | 15 | 2.8 | 2.4 | - | - | - | - | 5.6 | 2.8 | 2.8 | - | - |
| 2 | 16 | 5.6 | 15.4 | 2.8 | 2.8 | - | 4.2 | 22.4 | 16.8 | 11.2 | - | - |
| 3 | 17 | 7 | 15.4 | 1.4 | 4.2 | - | 11.2 | 16.8 | 15.4 | 9.8 | 1.4 | - |
| 4 | 18 | 4.2 | 11.2 | 4.2 | 1.4 | 11.2 | 7 | 2.8 | 9.8 | 11.2 | - | - |
| 5 | 19 | 8.4 | 4.2 | 2.8 | 4.2 | 9.8 | 5.6 | 4.2 | 12.6 | 7 | - | - |

**Table 5: Association of SE status with BMI, Anemia and KAP levels**

| S. No. | SE status | BMI (%) | | | | Anemia (%) | | | KAP levels (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Malnutrit ion | Healthy | Over weig ht | Obesit y | Mild | Moderate | Severe | Poor | Fair | Good | Exc ellent |
| | L | 5.7 | 19 | 3.8 | 2 | 7.6 | 13.3 | 9.5 | 15.5 | 15.5 | - | - |
| 2 | UL | 17.1 | 22.8 | 5.7 | 5.7 | 7.6 | 17.1 | 28.5 | 32.5 | 20.9 | - | - |
| 3 | LM | 3.8 | 3.8 | 2 | - | 3.8 | 2 | 3.8 | 7.6 | 2 | - | - |
| 4 | UM | - | 2 | - | 2 | - | - | 2 | 2 | 2 | - | - |
| 5 | U | - | - | - | 2 | - | - | 2 | - | 2 | - | - |

**Table 6: Knowledge levels of two groups in pre and post tests in different parts of tool**

| Sl.No. | Subject | | Group name | N /% | Poor | | Fair | | Good | | Excellent | | Mean | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PreT | PostT | Pr e T | PostT | PreT | PostT | Pre T | PostT | Pre T | PostT |
| 1 | Part2 | A | Control group | n | 13 | 14 | 14 | 17 | 6 | 3 | 3 | 2 | 3.8 | 3.25 |
| | | | | % | 36 | 37.6 | 39.2 | 49.3 | 16.8 | 8.1 | 8 | 5 | | |
| | | | Expt. group | n | 15 | 1 | 15 | 15 | 5 | 14 | 1 | 6 | 3.1 | 5.8 |
| | | | | % | 42 | 2.8 | 42 | 42 | 14 | 39.2 | 2 | 16 | | |
| | | B | Contr ol group | n | 25 | 24 | 11 | 12 | - | - | - | - | 1.1 | 1.3 |
| | | | | % | 70 | 67 | 30 | 33 | - | - | - | - | | |
| | | | Expt. group | n | 29 | 2 | 5 | 12 | 1 | 21 | 1 | 1 | 1.2 | 3.7 |
| | | | | % | 81.2 | 5.6 | 14 | 33.6 | 2.4 | 58.8 | 2.4 | 2 | | |
| 2 | Part 3 | | Contr ol group | n | 21 | 21 | 9 | 14 | 5 | 1 | 1 | - | 2.5 | 2.3 |
| | | | | % | 58.8 | 58.8 | 25.2 | 39.2 | 14 | 2 | 2 | - | | |
| | | | Expt. group | n | 17 | 6 | 15 | 16 | 4 | 13 | - | 1 | 2.8 | 4.8 |
| | | | | % | 47 | 16.8 | 42 | 44.8 | 11 | 36.4 | - | 2 | | |
| 3 | Part 4 | | Control group | n | 30 | 31 | 6 | 5 | - | - | - | - | 1.3 | 1.3 |
| | | | | % | 84 | 86 | 16 | 14 | - | - | - | - | | |
| | | | Expt. group | n | 29 | 5 | 7 | 24 | - | 6 | - | 1 | 1.3 | 4.4 |
| | | | | % | 81 | 14 | 19 | 67.2 | - | 16.8 | - | 2 | | |
| 4 | Total | | Control group | n | 16 | 20 | 20 | 16 | - | - | - | - | 8.8 | 8.3 |
| | | | | % | 44 | 56 | 56 | 44 | - | - | | | | |
| | | | Expt. group | n | 22 | - | 13 | 12 | 1 | 24 | - | - | 8.5 | 17.8 |
| | | | | % | 61 | - | 36 | 33 | 3 | 67 | - | - | | |

## CONCLUSION:

There were number of studies conducted related to KAP levels and impact of education trainings in either anemia or in PCOD separately. But, there were no reports on influence of education trainings on KAP levels in both RH concerns, anemia and PCOD together. Hence, first time the present study successfully conducted to assess KAP levels in anemia and PCOD of adolescent girls suffering from both (anemia and PCOD) in selected location. The present young generations are more attractive towards technology driven self learning methods using mobiles or computers which help them ease of carrying, storing, handling and using at any time in any place. Hence, an ICT module was chosen to provide awareness along with the required knowledge, practices to control and prevent two major RH challenges of adolescent girls (anaemia and PCOD). It was concluded from the present study that there was a significant increase in KAP levels of girls in anemia and PCOD after training by an ICT enabled tailored module. The steps to be adopted and strengthened by government both at regional and local level for adequate provision of health services by displaying it in schools and pre university colleges for enhancing attitudes and practices. It reduces the burden of two RH challenges for further creation of healthy future generation.

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