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AWARENESS ON INFERTILITY ISSUES AND ITS FACTORS AMONG UNIVERSITY YOUNG ADULTS IN A CITY IN MALAYSIA

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ABSTRACT

The aim of the study is to assess the awareness of young adults regarding infertility issues. Besides, it also evaluated the level of knowledge regarding the factors affecting and leading to infertility. A cross sectional survey among the young adults has been conducted with distribution of questionnaire containing 43 questions, divided into 5 sections which include demographic data, age related fertility issues, plans on having children, lifestyle factors on fertility was distributed to the participants for data collection. The knowledge of students on the first decline of the male fertility was seem to be significant that it depends on the either male or female participant's preference, because 59% of female participants chose 50 to 54 years as their option and 60% of male participants preferred to opt for 45 to 49 years old. Besides, weight factor towards female fertility have also shown significant value ($p < 0.05$), thus depending on the gender, the answer varies. The majority of both male (60/60%) and female (84/77%) students have claimed that either excess weigh or being underweight both would lead to infertility issues in female. As a conclusion, it was found that young adults are aware of the infertility issues and the factors causing it. In addition to this, participants's knowledge on ways of overcoming infertility situation if it occurs.

KEYWORDS: Infertility, age factor, lifestyle factors, diet, Leptin.

INTRODUCTION

Fertility is defined as ability to conceive within 12 months of unprotected intercourse between couples. Primary infertility would be considered if the first time conception attempt fails while subfertility would occur in couples whose attempt to conceive for second child fails.[1]

The infertility rate can be estimated through the total fertility rate that is the average number of children that will be given to birth by women if those women lived up to their motherhood years. In simple terms, total fertility rate is the births per woman. From this data, when there rate of fertility declines it eventually shows that increase in the infertility rate. The demographic data of infertility rate around the world population in the year 2000 shows that Malaysia has 3.29 of total fertility rate. Yet, the rate has slowly decline to 2.64 in the year 2012. Thus, this indicates that infertility rate in Malaysia has increased as years goes by.

There are contributing factors that leads to infertility such as eating habits, stress, and exercise. Nowadays, most working people, especially women do not give importance to their eating lifestyle due to increase in workload and lifestyle changes which eventually increases stress level. Psychological functions in the body rely on the endocrine secretion levels, thus infertility also affected by hormonal secretion.[2]

Age plays important role in leading women to infertility because, as age increases the egg production in females would decrease or due to early puberty the mature eggs might be released first. Infertility including fetal and maternal difficulties usually associated with age factor. Apart from stress factor, diet influences the fertility rate among both men and women. Another study stated that infertility is strongly related to western diet and lifestyle of people which consist of intake of red meats, sugary desserts, high fat containing food, high amount of sugar containing drinks and foods with low content of essential vitamins and minerals.

Chocolates, coffee, tea and soft drinks containing certain amount of caffeine which being consumed by most people since these foods are easily available and cheap. Though, intake of these foods and drinks has shown to delay the time taken to conceive, because it is believed to affect mainly the female reproductive system.

Consumption of alcohol in which more than 140g per week eventually can cause harm towards the health. It was found that greater exposure of infertility issues were faced by high

amount of alcohol consumers.[4] Smoking is another important factor which contributes to infertility in both men and women. In women, in causes delay in the time take to pregnancy and also decreases the number of pregnancy rates in couples opting for assisted reproduction cycles.[1] Working out regularly is essential for a human to lead a healthy life. Another study has proved that exercising regularly can protect an individual from diseases like obesity, cardiovascular issues, diabetes, hypertension, osteoporosis and stress.[5]

Reproductive surgery, hormone administration and assisted reproductive technologies (ART) including clinical and laboratory procedures can be opt by infertile couples to overcome conceiving issues.

Complementary and Alternative Medicine (CAM) is medical help and products that are not a component of conventional medicine. CAM has been looked for as an assistance by three quarters of the world's population to maintain a good health.[6]

This study was conducted with an aim to assess the awareness of the participants regarding infertility issues. In addition to that, other objectives of the study are to evaluate the level of knowledge students have on each factor that leads to infertility. The awareness of students towards the factors was also investigated in this study.

MATERIALS AND METHOD

The study was conducted as descriptive cross sectional study whereby the factors affecting fertility among women and men were studied among the allied medical university students from a city in Malaysia.

A total of 100 female participants and 50 male participants were approached to involve in this study. The data collection was completed through distribution of questionnaire containing 43 questions which was gained from a journal, which consist of 5 sections that are; demographic data (8 questions), lifestyle factors (9 questions), plans on having children (5 questions), age related fertility issues (5 questions), and lifestyle related fertility issues (16 questions) (Nouri *et.al.*, 2014).

The questionnaire responses were evaluated through a software called Statistical Package for Social Science (SPSS) for Windows version 20 and Microsoft Excel 2013. In the SPSS software, all the data were transformed into frequency and percentage forms for better view of the results. These frequencies and percentages were applied to assess the level of

awareness among the participants on infertility and the factors affecting it. Besides, tests such as cross tabulations, Spearman's test, Fisher's test and Chi-square test were conducted in order to analyze the data collected. Cross tabulation and Spearman's test were conducted to assess the compare the relationship between the variables. Then, Fisher's test and Chi-square test were done to evaluate the connection between categorical variables in the study.

RESULTS AND DISCUSSION

Results

In this study, total of 150 students, including 100 female students and 50 male students participated. The number of male and female students are not in balance terms because of availability of male students were limited in university selected and some students were attending their attachment in the hospitals and training centers while the data collection was conducted. Thus, limited number of male participants were obtained in this study. On the other hand, targeted female participants were obtained as 100 students took part in this study. The data collection was conducted among pharmacy and physiotherapy students only, without any conditions in the number of students from each course. So, in total female students (n=100) and male students (n=50) were included in this study.

The mean age of participants in this study is 24.09 years which includes both female and male participants. The mean age for female participants is 24.29 years and for male participants obtained as 23.68 years.

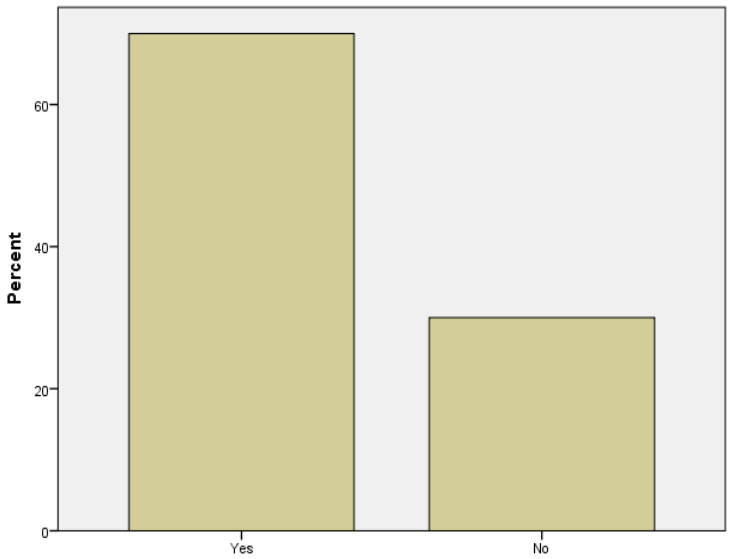

Figure 1: Consumption of caffeinated beverages.

Most participants consumes caffeinated beverages in their life. Being a student, it is a usual drink that students prefer for their daily intake. 70% of the total sample size drinks caffeinated beverages on regular basis (fig:1).

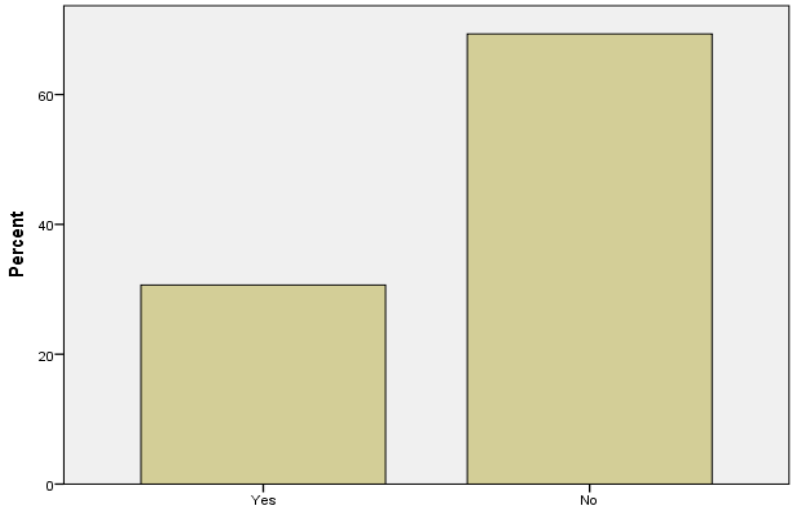

Figure 2: Consumption of alcohol drinks.

Since the most of students participated in this study were females (n=100) compared to males (n=50), the above bar chart shows that most students, 69.3% do not consume alcohol drinks. Yet, the 30.7% of the students do consume alcohol drinks regularly (fig:2).

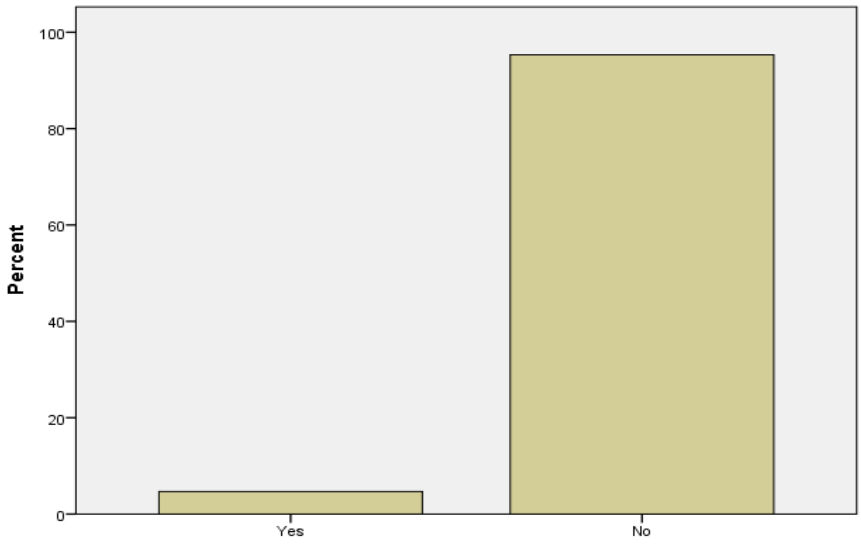

Figure 3: Number of participants who smokes and do not smoke,

Fig: 3 clearly portrays most participants involved in this study do not smoke. It shows that a good, healthy lifestyle practices are maintained by the participants, whereby 95.3% of them do not smoke.

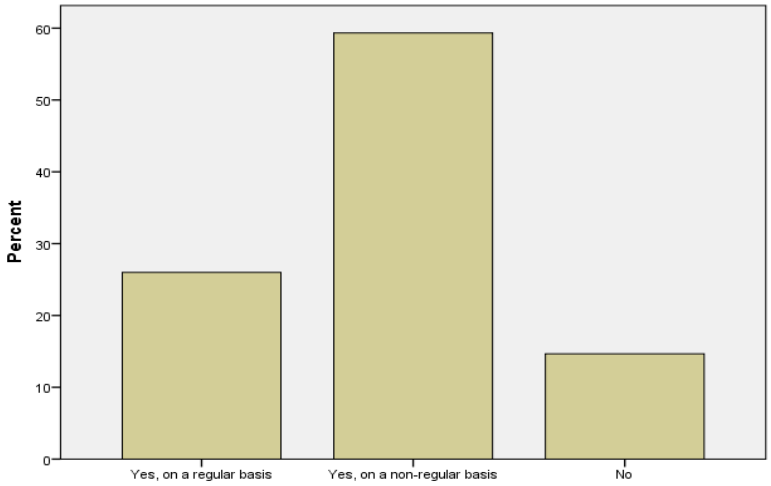

Figure 4: Number of participants who exercise and do not exercise.

Fig: 4 Shows percentage of students who exercise on regular basis, non-regular basis or who do not exercise. Most number of students where 59.3% of total participants claimed to exercise irregularly while 26% of them work out consistently. Remaining of them do not exercise in their normal routine.

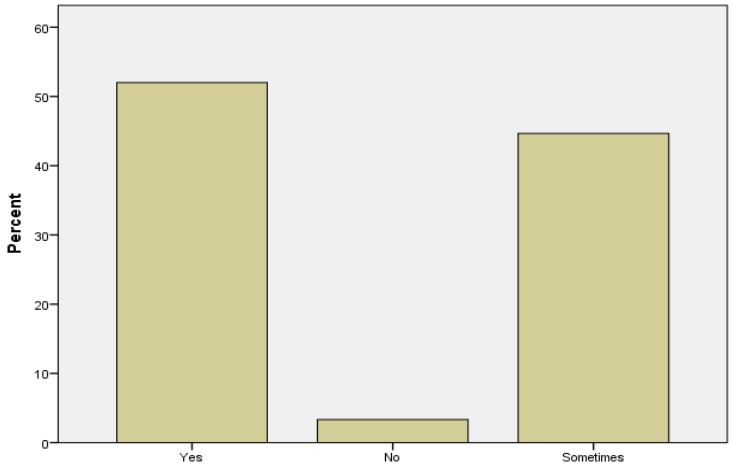

Figure 5: Importance given in following healthy and balanced diet.

As shown in fig:5 above, most participants of this study (52%) have considered balanced and healthy diet as an important element in their life. 44.7% of the students at times would consider it is important to maintain a healthy and balanced diet. While, very least number of people, 3.3% of the total participant have not given more attention on maintain healthy and balanced diet.

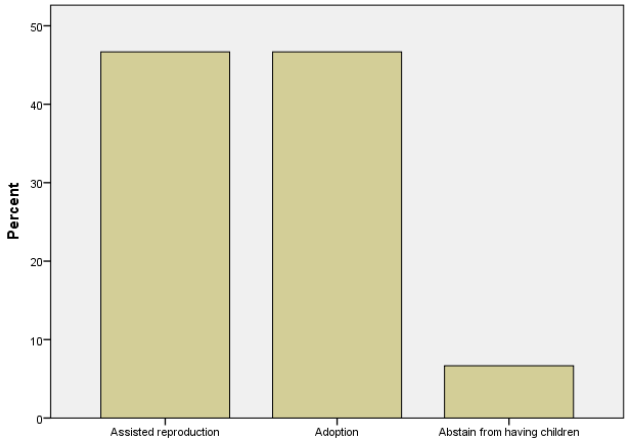

Figure 6: The chart portraying the ways to overcome infertility

The bar chart in fig:6 shows the number of students choosing the option they prefer in the case of infertility issue been faced by them. Equal number of students (n=140) have chosen assisted reproduction and adoption. While, least number of students (n=10) have opted abstaining from having children as their preference.

Table 1: Age at which women are most fertile.

Answers chosen	Female participants (%)	Male participants (%)
20 -24 years	62.0	58.0
25 - 29 years	38.0	42.0

According to table 1, 62% of female participants have chosen the answer 20-24 years old which is actual answer for the question. While the remaining 38% of female participants has chosen 25-29 years old which is the next acceptable answer for this question. On the other hand, 58% of male participants from total 50 male students, have chosen 20-24 years old as their answer. 42% of them opt the answer 25-29 years old.

Table 2: Age at which first decrease occur in female fertility.

Answers chosen	Female participants (%)	Male participants (%)
30 -34 years	49.0	54.0
35 - 39 years	51.0	46.0

Table 2 shows the response given by the participants for the question on at which age women's fertility would face a decrement. As shown in the table, 49% of the female participants have opted for the answer 30-34 years old, while 51% of them decided on 35-39 years old as their answer. In contrast, the male participants, 54% of them chosen 30-34 years old and 46% of them chose 35-39 years as their respective answers.

Table 3: Age at which second marked decrease occur in female fertility.

Answers chosen	Female participants (%)	Male participants (%)
35 - 39 years	25.0	12.0
40 - 44 years	75.0	88.0

Continuing from the above question, a second marked decrease in the women's fertility was asked. Out of 9 options, both male and female participants have chosen 35 to 39 years, 40 to 44 years and 45 to 49 years old as their answers. Most female participants have opt for 40 to 44 years old option with the 75% of the total participants. While, most male participants (88%) has selected 40 to 44 years as the answer. Remaining 12% of them selected 35 to 39 years old as the answer (table 3).

Table 4: Age at which first decrease occur in male fertility.

Female participants (%)	Male participants (%)	
35-39 years	8.0	8.0
40 -44 years	12.0	32.0
45-49 years	21.0	60.0
50-54 years	59.0	0.0

According to table 4, male fertility decline mostly assumed to occur at the age of 50 to 54 years for female participants, 59% of female students have preferred the answer. While only 8% has chosen 35 to 39 years as the answer by both male and female participants. Whereas, most male participants opt for 45 to 49 years old answer with percentage of 60%. The p value obtained from this data was less than 0.05 which indicates the date to be significant that the awareness of students towards when the decline in the male fertility firstly to occur is associated with the gender of the students.

Table 5: Age at which second decrease in occur in male fertility.

Answers chosen	Female participants (%)	Male participants (%)
55-59 years	45.0	56.0
equal and more than 65 years	55.0	44.0

For the question regarding age at which following decrease in the male fertility would occur, most female participants, 55% of them answered 65 years and above, whereas 56% of male participants chosen 55 to 59 years old as their answer (table 5).

Table 6: The effect of caffeinated beverages on female fertility.

	Female participants (%)	Male participants (%)
Reduces female fertility	34.0	24.0

Table 6 shows participants have higher awareness on the effects of caffeine because both male and female students has chosen the option where on regular intake caffeine drinks would lead to decline in female fertility but on random intake it does not affect fertility. 66.0% of female and 76.0% of male students have chosen the answer. The remaining students had knowledge that consumption of caffeinated beverages will reduce the female fertility.

Table 7: The effect of caffeinated beverages on male fertility.

	Female participants (%)	Male participants (%)
Regular consumption reduces male fertility, occasional consumption doesn't	64.0	74.0
Reduces male fertility	36.0	26.0

While, the male fertility is believed to be reduced also when caffeinated drinks taken on regular basis but no effect if it is taken infrequently because majority of male (74.0%) and female (64.0%) students preferred the answer. The other participants had lower preference that caffeinated drinks will definitely reduce male fertility where female with 36% and male with 26% of them (table 7).

Table 8: The effect of alcohol consumption on female fertility.

	Female participants (%)	Male participants (%)
Regular consumption reduces female fertility, occasional consumption doesn't	50.0	54.0
Reduces female fertility	50.0	46.0

The awareness regarding frequent alcohol consumption leading to female infertility issues, yet irregular intake may not affect the fertility comparing to alcohol consumption reduces the fertility in females is been equally distributed in female students. On the other hand, male students have lesser preference towards the concept of reduction in female fertility due to alcohol consumption. Majority of male students believed that alcohol intake in consistent basis would reduce fertility, not on irregular basis (table 8).

Table 9: The effect of alcohol consumption on male fertility.

	Female participants (%)	Male participants (%)
Regular consumption reduces male fertility, occasional consumption doesn't	47.0	54.0
Reduces male fertility	53.0	46.0

53% of the total female students presumed that male fertility would be reduced due to alcohol consumption. Though remaining 47% of female students deduced that on regular intake of alcohol, the male fertility would be affected but on occasional intake, it does not affect male fertility. However, male students have the opposite perception on the effect of alcohol consumption when compared with female student's knowledge (table 9).

Table 10: The effect of smoking on female fertility.

	Female participants (%)	Male participants (%)
Regular consumption reduces female fertility, occasional consumption doesn't	30.0	28.0
Reduces female fertility	70.0	72.0

The knowledge of both female and male students towards the smoking consequences on female fertility was similar since the percentage of students opt for each answers nearly same. Their knowledge seems to be higher towards the reduction of female fertility due to smoking rather than depending on the frequency of smoking. 70% of the female students and 72% of male students show the knowledge on female fertility being affected due to smoking (table 10).

Table 11: The effect of smoking on male fertility.

	Female participants (%)	Male participants (%)
Regular consumption reduces female fertility, occasional consumption doesn't	31.0	18.0
Reduces male fertility	69.0	82.0

The impact of smoking on male fertility were about similar level of knowledge for the students where 69% of female and 82% of male students have decided that it will reduce the fertility level. The remaining have still believed that on occasional level of smoking, fertility in men would not be affected (table 11).

Table 12: The effect of moderate exercise on female fertility.

	Female participants (%)	Male participants (%)
Increases female fertility	54.0	50.0
Doesn't affect female fertility	46.0	50.0

Exercising factor related questions were divided into two, moderate exercise and intense exercise effect towards male and female fertility. Above table shows the equal distribution of the total male participants that supporting female fertility to be increased and no effect on female fertility. While, female students, 54% of them favored the fact that moderate exercise increases the fertility rate. The remaining 46% of them have opinion that fertility is not affected in any way through moderate exercise (table 12).

Table 13: The effect of intense exercise on female fertility.

	Female participants (%)	Male participants (%)
Increases female fertility	32.0	42.0
Doesn't affect female fertility	68.0	58.0

Intense exercise is seem to be having no effect on the female fertility with the evidence where 68% of female and 58% of male students who have choose the answer. There were still the remaining students have a knowledge on intense exercise to increase the female fertility, as shown in table 13.

Table 14: The effect of moderate exercise on male fertility.

	Female participants (%)	Male participants (%)
Increases male fertility	50.0	44.0
Doesn't affect male fertility	50.0	56.0

Table 14 shows the preferences of students towards the effect of moderate exercise on male fertility levels. It shows that female students equally chose that moderate exercise will either increase or does not affect the male fertility. Besides that, male student's knowledge is higher in male fertility is not affected due to moderate exercise. The remaining students, prefer that it increases male fertility.

Table 15: The effect of intense exercise on male fertility.

	Female participants (%)	Male participants (%)
Increases male fertility	41.0	44.0
Doesn't affect male fertility	59.0	56.0

Participants have higher knowledge on the fact that intense exercise has no effect on the male fertility with 59% of female and 56% of male student's preference. The remaining 41% of female and 44% of male students show that male fertility can be increased through intense exercise (table 15).

Table 16: The effect of excess weight on female fertility.

	Female participants (%)	Male participants (%)
Doesn't affect female fertility	16.0	40.0
Reduces female fertility	84.0	60.0

The next two questions were related to weight factor towards fertility issues. Excess weight is observed to have negative effect towards female fertility from the above table shown, where 84% of female and 60% of male students opted the option of excess weight will reduce female fertility. The remaining least number of students feels that excess weight does not affect female fertility. This result seems to be significant where the options chosen strongly depend on the gender of participants (table 17).

Table 17: The effect of being underweight on female fertility.

	Female participants (%)	Male participants (%)
Doesn't affect female fertility	23.0	40.0
Reduces female fertility	77.0	60.0

Majority of participants including male and female have more knowledge of female fertility can be reduced of being underweight with 77% of female and 60% of male students preferred the option. Still, few students have desired that underweight does not affect female fertility. Underweight factor is deeply related to which gender of students preferring. Thus, the p value obtained was less than 0.05 (table 17).

Table 18: The effect excess weight on male fertility.

	Female participants (%)	Male participants (%)
Doesn't affect male fertility	20.0	32.0
Reduces male fertility	80.0	68.0

While the influence of weight towards male fertility were assessed through the next two questions. The table above shows the effect of excess weight on male fertility where 80% of female students and 68% of male students selected that it reduces the male fertility. The remaining students preferred that excess weight to not have any impact on the male fertility (table 18).

Table 19: The effect of being underweight on male fertility.

	Female participants (%)	Male participants (%)
Doesn't affect male fertility	40.0	54.0
Reduces male fertility	60.0	46.0

Student's knowledge on male fertility and being underweight seem to be higher in female participants (60%) and lower in male participants (46%). The least remaining female students (40%) and most male students (54%) considered that male being underweight would not affect the fertility (table 19).

Table 20: The effect of a healthy and balanced diet on female fertility.

	Female participants (%)	Male participants (%)
Increases female fertility	75.0	76.0
Doesn't affect female fertility	25.0	24.0

Knowledge on the outcome of healthy and balanced diet towards female fertility seem to be high in both male and female students where 75% of female and 76% have opted that it increases the female fertility (table 20).

Table 21: The effect of a healthy and balanced diet on male fertility.

	Female participants (%)	Male participants (%)
Increases male fertility	75.0	76.0
Doesn't affect male fertility	25.0	24.0

The similar data has been showed as on the above table on the evaluation of healthy and balanced diet influence towards male fertility. This shows that the knowledge of participants proper diet factor which leads to increase in the male fertility (table 21).

DISCUSSION

In the modern era, delaying the time to conceive first baby have been a usual matter that people consider lightly due to lack of awareness on infertility. There are various factors, which can affect the fertility rate of women and men in the time of delaying the conception. This study has been conducted to evaluate the knowledge University students have towards infertility and the factors affecting it.

The lifestyle these students practice cannot be judged as healthy or unhealthy due to different individual has their own way of living. Caffeinated drinks are the most preferred type of drinks among participants. They realize that female and male fertility can be affected or reduced in the case where drinks containing caffeine is taken on regular basis but does not have any effect of fertility if it is consumed occasionally. Supporting this statement where fertility is affected by high consumption of caffeine, studies has shows strong association between coffee intake and prolonging of pregnancy time.[8] In the research done, the mechanisms through which female fertility being reduced were postulated for example, reduction in the levels of prolactin and estrogen believed to delay the conception time by reducing the fertility.[9,10,11]

Most students do not consume alcoholic drinks. This result was obtained, as such due to the number of participants were not equally divided. In this study, 100 female students and 50 male students have been participated, thus female participants would not consume alcohol-contained drinks on regular basis. Most number of male students would fall on the 30.7% range of which the option Yes been chosen, with that, a small number of female students have contributed to the number. Studies conducted for long-term investigation on the effect of alcohol intake carried out in five European countries found that high alcohol consumers definitely go through fertility issues.[4] The same study also proved that, those alcohol consumers who drinks in moderate levels are also prone to be affected by infertility.[4,5] It deduces that alcohol consumption has a negative effect on the fertility rate and conceiving, and the participants are aware of the same.

From the results, 95.3% of the total students claimed themselves for not smoking. This eventually shows the rate of awareness of students towards smoking as a hazard to fertility. Males are believed to be affected in term of fertility issues like reduced sperm production, motility problems and DNA damages. On the other hand, female fertility can be affected by influencing the hormone levels.[13,14]

Body weight, diet and exercising are interred related in which, people who do not exercise regularly and consume unhealthy, unbalanced diet would eventually result in increased body weight. These three factors are important but usually ignored by the people as well as the complications it causes in terms of fertility. In general, most students follow working out without a regular timing, mentioned in the Figure4.4 (Klonoff-Cohen H, *et.al.,* 2002; P. Nazni, *et.al.,* 2004).

The answers mostly preferred by the students were showing high level of awareness with the reference to the Tables 4.16 to 4.19. A study by F.Bolumar, *et.al.* in 1997 has showed a strong association between obesity and women who are trying to conceive. This study also stated that smoking women who smokes face more fertility issues than others. A theory regarding recently found protein, leptin, which will be secreted by adipocytes, would give an effect on infertility and obesity. Leptin is a hormone that acts by increasing energy use in body and as a result, the person will experience weight loss. In obesity cases, the leptin level seems to be high in the serum, leading to insensitivity and decrease in the biologic function of the hormone. Women who are underweight would face fertility issues if they smoke or having reproductive system dysfunction (Kassim-Karakas, *et.al.,* 2004; M. Revonta, *et.al.,* 2010; P. Nazni, *et.al.,* 2014; Zitzmann M, *et.al.,* 2003; F.Bolumar, *et.al.,* 1997).

Majority of the students opted for the option of it increasing the fertility related, indicating the acceptable awareness level of the students towards the positive relation of diet and infertility. This is because diet directly or indirectly affects many other factors like weight, stress and consumption of alcohol or caffeinated drinks. Body weight and composition are considered essential element in reproduction process which is mediated by diet (P. Nazni, *et.al.* 2014; G.F Homan, *et.al.,* 2007).

Participants have shown their good knowledge on the relationship of age and fertility. The first decline in female fertility is proved to occur at the age of 35 years old. Female fertility would be affected through decrease in the number and quality of oocytes being released. On

the other hand, male fertility would be affected in term of low sperm count and its motility, which are important factor that plays in the reproductive system (Pal and Santoro, 2003; Baird et al., 2005; Kaplan et al., 2005; Angell, 1994; Benadiva et al., 1996). A significant result on the knowledge of first decrease of male fertility was seen through the chi square test performed ($p< 0.05$) which reflects the proper knowledge that students have towards age and infertility.

Equal number of students has opted for assisted reproduction and adoption, with reference to Figure 4.6 (Feichtinger, *et.al.,* 1997; G.F Homan, *et.al.,* 2007). Infertility is a condition where it can be overcome by assisted reproductive technologies (ART). There are various ART options available, like in-vitro fertilization (IVF), intracytoplasmic sperm injection, pre-implantation genetic diagnosis, embryo cryopreservation and gestational surrogacy processes (Kelley-Anne, *et.al.,* 2013) which provide the infertile couples with their preference way of treating infertility. In the same study, it was also stated that IVF is one the effective way that helps couples to overcome the problem.

CONCLUSION

The outcome of this study is that young adults with medical background are aware of infertility issues. Besides, the factors affecting both male and female fertility could be identified and the knowledge regarding it was exhibited through the answers in the questionnaire. This also supports that allied medical students have enough knowledge on the health issues and its factors causing it. In addition to this, the awareness of students on the ways of overcoming infertility issues was also assessed.

Infertility is a reproductive issue that has been increasing in term of rate worldwide. Awareness on the issue and the factors required to be spread and ensured to be known from all stages of age. This is because the lifestyle habits that have been practiced since young age would eventually give a major or minor impact towards fertility during conception. Besides, society should be informed on this issue to increase the awareness on the infertility matter and the factors leading to decreasing rate of fertility among the population.

REFERENCES

1. M. Revonta, J. Raitanen, S. Sihvo, P. Koponen, R. Klemetti, S. Mannisto, R. Luoto, (Health and lifestyle among infertile men and women), Sexual and Reproductive Health Care 1, 2010 Aug; 1(3): 91-98.

2. Zuraida A.S., (Psychological distress among infertile women: Exploring bio-psychosocial response to infertility), Malaysian Journal of Psychiatry Ejournal, December 2010; 19(2): 82-92.
3. P. Nazni., (Association of western diet & lifestyle with decreased fertility, Indian J Med Res., 2014 Nov; 140(Suppl 1): S78–S81
4. Jan Eggert, Holger Theobald, Peter Engfeldt, (Effects of alcohol consumption on female fertility during an 18-year period), Fertility and sterility, February 2004; 81(2): 379- 383.
5. D. T. Baird, J. Collins, J. Egozcue, L. H. Evers, L. Gianaroli, H. Leridon, A. Sunde, A. Templeton, A. Van Steirteghem, J. Cohen, P. G. Crosignani, P. Devroey, K. Diedrich, B. C J M Fauser, L. Fraser, A. Glasier, I. Liebaers, G. Mautone, G. Penney, B. Tarlatzis., (Fertility and ageing). Human Reproduction Update, May 2005; 3(11): 261 276.
6. Ghina S. Ghazeeri, Johnny T. Awwad, Mohamad Alameddine, Zeina MH. Younes, Farah Naja. (2012), (Prevalence and Determinants of Complementary and Alternative Medicine use among infertile patients in Lebanon: A cross-sectional study), BMC Complementary and Alternative Medicine, Aug 2012; 12(1): 129.
7. Kazem Nouri, Dagmar Huber, Katharina Walch, Regina Promberger, Bernd Buerkle, Johannes Ott, and Clemens B Tempfer., (Fertility awareness among medical and non-medical students: a case-control study), Reproductive Biology and Endocrinology, 2014; 12: 94.
8. Francisco Bolumar, Jorn Olsen, Marisa Rebagliato, Isabel Saez-Lloret, Luigi Bisanti., (Caffeine intake and delayed conception: a European multicenter study on infertility and subfecundity: European Study Group on Infertility Sub-fecundity). American Journal Epidemiology, 1997; 145(4): 324–334.
9. Bolumar F, Olsen J, Boldsen J., (Smoking reduces fecundity: a European multicenter study on infertility and subfecundity). American Journal of Epidemiology, 1996; 143: 578-587.
10. Petridou E, Katsouyanni K, Spanos E, et al. Pregnancy estrogens in relation to coffee and alcohol intake. Ann Epidemiol, 1992; 2: 241-247.
11. Kapidaki M, Roupa Z, Sparos L, et al. Coffee intake and other factors in relation to multiple deliveries: a study in Greece, Epidemiology, 1995; 294-8.
12. Parazzini F, Chatenoud L, Di Cintio E, La Vecchia C, Benzi G, Fedele L. (Alcohol consumption is not related to fertility in Italian women.) BMJ, 1999 Feb; 318(7180): 397.

13. Homan GF, Davies M, Norman R. (The impact of lifestyle factors on reproductive performance in the general population and those undergoing infertility treatments: a review.) Hum Reprod Update, 2007; 13: 209–223.
14. Zenzes MT, Bielecki R, Reed TE. (Detection of benzo (a) pyrene diol epoxide-DNA adducts in sperm of men exposed to cigarette smoke.) Fertil Steril., 1999; 72: 330–5.
15. Kasim-Karakas SE, Almario RU, Gregory L, Wong R, Todd H, Lasley BL. (Metabolic and endocrine effects of a polyunsaturated fatty acid-rich diet in polycystic ovary syndrome.) J Clin Endocrinol Metab, 2004; 89: 615–20.
16. Zitzmann M, Rolf C, Nordhoff V, Schrader G, Rickert-Fohring M, Gassner P, (Male smokers have a decreased success rate for *in vitro* fertilization and intracytoplasmic sperm injection. Fertil Steril., 2003; 79(Suppl 3): 1550–4.
17. Pal L and Santoro N, (Age-related decline in fertility.) Endocrinol Metab Clin North Am, 2003 September; 32(3): 669–688.
18. Kaplan B, Nahum R, Yairi Y, Hirsch M, Pardo J, Yogev Y and Orvieto R, (Use of various contraceptive methods and time of conception in a community-based population.) Eur J Obstet Gynecol Reprod Biol, 2005 Nov; 123(1): 72–76.
19. Angell RR, Aneuploidy in older women. Higher rates of aneuploidy in oocytes from older women. Hum Reprod, 1994; 9(7): 1199–1200.
20. Benadiva CA, Kligman I and Munne S; (Aneuploidy 16 in human embryos increases significantly with maternal age.) Fertil Steril, 1996; 66: 248–255.
21. Feichtinger W, Papalambrou K, Poehl M, Krischker U and Neumann K; (Smoking and in vitro fertilization: a meta-analysis.) J Assist Reprod Genet, 1997; 14: 596–599.
22. Kelley-Anne Sabarre, Zainab Khan, Amanda N Whitten, Olivia Remes and Karen P Phillips., (A qualitative study of Ottawa university students' awareness, knowledge and perceptions of infertility, infertility risk factors and assisted reproductive technologies (ART)., Reproductive Health, 2013; 10: 41.