Is there a relationship between health literacy and lifestyle in infertile males and females in City Zahedan?

ABSTRACT

Background and Objectives: Reproductive health is gently decreasing because of multiples exogenous and endogenous factors, such as diet, behavior and environmental contaminants.Since nutritional behaviors are a required part of a healthy lifestyle, therefore, this study aimed to find out the relationship between health literacy, lifestyle in infertile males and females in Zahedan, Iran.

Materials and Methods: The present descriptive cross-sectional study was conducted on 86 men and 181 women who referred to Infertility center (Ali Ibn Abi Talibmolod Hospital) in Zahedan through random selection method. To collect data Health literacy standard questionnaires (HELIA), Miller-Smith lifestyle assessment inventory (LSI) were used. Collected data were analyzed by SPSS v.22 software.

Results: There was statistically significant relationshipbetween health literacyand Lifestyle ($r = 0.326$ $p<0.001$) as well as both of them withsome nutritional behaviors ($p \leq 0.05$).People with higher levels of health literacy had better lifestyle and healthy nutritional behaviors.

Conclusion: The results showed that health literacy had a significant association withLifestyle.It is necessary to design and implement appropriate educational interventions to improve nutrition knowledge and promote healthy fertility as one of the important priorities of the society.

Paper Type: Research Article

Keywords: Females, Health literacy, Infertility, Lifestyle, Males.

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Introduction

Infertility is the inability to conceive for more than a year despite regular unprotected sex without using any contraceptive method. It affects millions of families around the world, touching about 1 in 4 couples in developing countries and 1 in 7 couples in developed countries (1). The experience infertility can be caused by variety of lifestyle factors (2). A person's lifestyle refers to their lifestyle, which may include different nutritional and eating habits, physical activity, smoking, sleep patterns, use of medical services and techniques to reduce stress. Each person's way of life affects their well-being and health. Consequently, promoting habits and having a healthy lifestyle are two vital ways to ensure and maintain health (3).

On the other hand, health literacy is necessary for empower people to change their lifestyle as well as behavior to improve their life quality and health. Health literacy refers to the "individual'scapacity to gain, interpret, and understand thebasic information and health services, which isnecessary for appropriate decision-making"(4).

A study shows that poor health literacy affects all levels of the health care. It also disrupts provider–patient communications, and affects the ability to access and navigate the health service system (5). In addition, health literacy plays an important role in knowledge as well as reproductive behavior (6).

Azizi's study showed that infertile couples have a more unhealthy life than fertile couples, but this relationship was not statistically significant (7).

Moreover, health behaviors such as exercise and nutrition playan important role in protecting and promoting people's health. Good nutrition is one of the main determinants of health (8).

Chang et al. indicated that functional health literacybased on a behaviors combination including nutrition was predictive of a total score on health-promoting behavior (9). A systematic review reported that the identified studies did not confirm a significant association between health literacy and fat intake (only one study) or salt (2 cross-sectional studies). In turn, a relationship between lower sugar consumption and higher health literacywas reported by three of the seven eligible studies. In two studies, there was no association and in one study, this association occurred only in males (10).

Due to lifestyle changes, it is necessary to apply changes in nutritional behavior.Considering the increase in the prevalence of infertility and the importance of childbearing, especially in Iran, and the effect of quality of life and health literacy on it, as well as the important and key role of nutrition as one of the dimensions of lifestyle in determining the fertility health of couples, the lack of sufficient studies in this field and the difference in behavioral habits of the city of Zahedan (southeast of Iran), therefore, the purpose of this study is to investigate the relationship between health literacy and lifestyle in infertile men and women of Zahedan.

Materials and Methods

Study design and participants

In this descriptive-analytic cross-sectional study, 86 infertile males and 181 infertile

females (267 participants) were randomly selected from molod Infertility center in Zahedan, Iran, 2022.

Using the sample size formula for mean estimation with the 95% confidence interval (α=0.05), ρ=0.479 and d=0.06.

$$n = \frac{(Z_{1-\frac{\alpha}{2}})^2 \times \rho(1-\rho)}{d^2}$$

$$\text{n=} \frac{3.84 \times 0.497(0.503)}{0.0036} = 267$$

$$\alpha = 0/06$$

$$Z_{1-\frac{\alpha}{2}} = 1/96$$

$$p = 0.06$$

Inclusion criteria were: not having a history of stressful events in the last 6 months, having a infertility history for at least 1 yearand willingness to enter this study.

Exclusion criteria: incomplete questionnaire.

Data were collected from Infertility centerafter taking the ethics committee code (IR.ZAUMS.REC.1401.152). Then, the purpose of the study was explained (with the condition of the confidentiality of the information of the people), if the people were willing, they entered the studyby convenience sampling method.Two standard questionnaires with information form including (age, gender,sleep quality, BMI(body mass index),time of exercise, frequency of food consumption and use of vitamin supplements) were used to collect data(If the participants were unable to read, the researchers read the questions to them and completed the questionnaire.

Measurements

TheMiller-Smith Lifestyle Assessment Inventory (LSI) (11) and Health Literacy Questionnaire (HELIA: Health Literacy for Iranian Adults) (12), and an information form were used for data collection.

The Miller-Smith lifestyle questionnaire reliability and validity have previously been confirmed (Cronbach's alpha =0.864) (13). LSI has 20 questions. Items are rated on a 5-point Likert scale (always = 1, often = 2, sometimes = 3, rarely = 4, and never = 5) in which higher scores indicated unhealthy lifestyle Scores 76-100 showed a favorable lifestyle, 46-75 a moderate lifestyleand 20-45 showed a poor lifestyle.

The Iranian Health Literacy Questionnaire consists of 6 questions about (age, gender, place of residence, marital status, education level and job) with 33 questions and 5 sections as follow: reading skills (4 items and score:4-20), evaluation (4 itemsand score:4-20),comprehension (7 itemsand score:7-35) , accessibility (6 itemsand score:6-30)and decision making (12 items and score:12-60).The questions were rankedasquite hard (1),hard (2), neither easy nor hard (3),easy (4), quite easy (5).Also, the minimum and maximum scores of this questionnaire were33and 165, respectively.Reliability and validity of this questionnaire were evaluated by Montazeri et al. (Cronbach's alpha, from 0.72 to 0.89)(12).

Covariates

In this study, some covariates such as BMI, gender, sleep quality, time of exercise, consumption of (sweets, fruit, vegetables, meat, dairy, bread and cereals, nuts, sea food

and vitamin C, E, D supplement) were also considered.

Statistical Analysis

The mean ± SD or frequency were used for data expression. To analyze the dataand demonstraterelationship between health literacy and lifestyle, relationship between qualitative demographic variables with health literacy, lifestyle: Spearman's correlation coefficient, one-way ANOVA and an independent-samples t-test were used respectively. SPSS V.22 software was used to analyze the data at the significance level of 0.05.

Result

The mean age of the participants was 30.87±7.5; 32.2% of them were male, 67.8% were female, 55.4% were overweight, 51.7% had a good sleep quality, 44.2 and 49.8 of them consumed fruits and vegetables weekly, respectively. Most of the people consumed meat (63.4%), dairy products (43.4%) and nuts (32.6%) on a weekly basis, and most of them did not take vitamin E, C (64%) and D supplements (53.2%). (Table 1).

Mean scores of thelifestyle for infertile men and women was 69.5 ±9.60. Also, the meanscore for Health Literacy was 115.6 ±18.63. Furthermore, 70% of the participants had a moderate lifestyle and 39% did not have quite sufficient health literacy (**Table 2**). According to the findings, there was a significant relationship between lifestyle and BMI, duration of exercise, consumption of vegetable, sea food and nuts ($p \leq 0.05$). BMI, consumption of fruit, nuts, sea food as well as consumption of vitamin C, D and E supplement ininfertile men and women had a significant relationship with the health literacy level ($p \leq 0.05$) (Table 1). Additionally, health literacy had a significant relationship with lifestyle ($r = 0.326$, $p<0.001$).

Table 1. Frequency distribution of covariates variables

Variables		N (%)	Mean ± Std. deviation	Mean ± Std. deviation
			Health literacy	Lifestyle
Gender	Men Women p-value	86(32.2) 181(67.8)	116±17.69 115.5±19.41 0.819	70.52±10.38 68.98±9.19 0.221
Sleep quality	< 7 hours 7-8hours > 8 hours p-value	63(23.6) 138(51.7) 65(24.3)	110.2±19.04 118.7±18.83 114.69±17.76 0.011*	69.93±11.12 70.16±9.69 67.49±7.51 0.164
BMI	Under weight Normal Over weight Obese	31(11.6) 56(21) 148(55.4) 32(12)	116±17 120.7±19.15 115.5±19.25 107.1±15.37 0.013*	66.06±10.82 71.49±9.12 68.33±8.2 65.5±10.63 0.001*
Time of exercise	Does not has =30 minutes/day < 30 minutes/day > 30 minutes/day p-value	81(30.3) 58(21.7) 107(40.1) 21(7.9)	112.3±18.55 118.5±22.59 116.8±16.42 115.19±19.61 0.230	69.35±9.92 70.84±8.43 67.73±9.39 75.04±10.35 0.008*

Variables		N (%)	Mean ± Std. deviation	Mean ± Std. deviation
			Health literacy	Lifestyle
The consumption of sweets	Daily	111(45)	115±19	69.5±11
	Weekly	104(37)	115.4±18.6	69.96±8.96
	Monthly	52(18)	112.73±18	68.69±9.7
	p-value		0.364	0.638
The consumption of fruit	Does not have	3(1.1)	95±26.4	66.88±10.8
	Daily	115(43.1)	121.17±18.5	71.16±12.5
	Weekly	118(44.2)	131.16±17.39	78.66±2.8
	Monthly	25(9.4)	108.72±17.5	70.81±9
	Yearly	6(2.2)	99.66±23.5	68.4±9.5
	p-value		<0.001*	0.075
The consumption of vegetables	Does not have	10(3.7)	114.4±21	66.5±12.2
	Daily	44(16.5)	118.07±20.3	70.20±7.4
	Weekly	133(49.8)	118.7±15.07	73.38±8.8
	Monthly	66(24.7)	110±14.5	68.39±10
	Yearly	14(5.3)	115.6±17.8	69.48±9.15
	p-value		0.698	0.018*
The consumption of meat	Does not have	2(7.5)	113±36.7	69±10.7
	Daily	86(8.5)	119.6±18.4	81.5±24.07
	Weekly	155(63.4)	121±15.5	87±2.8
	Monthly	22(13.5)	114.6±18.7	69.7±7.9
	Yearly	2(7.1)	107.07±17.8	65.8±11.9
	p-value		0.078	0.10
The consumption of dairy	Does not have	9(3.4)	116±11	69.77±6.5
	Daily	70(26.2)	116.9±20.6	69.65±10
	Weekly	116(43.4)	117.2±17.6	70.09±9.03
	Monthly	59(22.1)	110.6±19.5	68±11
	Yearly	13(4.9)	117.08±18.5	69.5±6.9
	p-value		0.253	0.755
The consumption of bread and cereals	Daily	243(91)	115.8±19	69.65±9.6
	Weekly	24(9)	98.66±15.66	60±10
	p-value		0.582	0.053
The consumption of nuts	Does not have	33(12.4)	106±19.3	66.5±11.9
	Daily	42(15.7)	120±21	71.8±8.6
	Weekly	87(32.6)	119±16.8	70.35±10
	Monthly	75(28.1)	116±18	68.5±9.3
	Yearly	30(11.2)	108.5±18	70±8
	p-value		0.001*	0.024*
The consumption of sea food	Does not have	21(7.9)	110.7±17.9	70.57±9.4
	Daily	7(2.6)	116.5±15.7	66±7.6
	Weekly	87(32.6)	122.2±16.8	72.2±9.9
	Monthly	109(40.8)	130±19.6	68±8.5
	Yearly	43(16.1)	111.3±18.6	67.5±10.7
	p-value		0.002*	0.012*
The consumption of vitamin C,E supplement	has	96(36)	119.5±16.8	69.5 ±8
	Does not have	171(64)	113.5±19.6	69.4±10
	p-value		0.012*	0.895
The consumption of vitamin D supplement	has	125(46.8)	118.3±16.3	70±8.8
	Does not have	142(53.2)	113.3±20.5	68.9±10.2
			0.029*	0.365

* Based on independent t test and one-way Anova

Table2. Frequency health literacy and lifestyle based on score classification

Variables		N (%)	mean	Std. deviation	Pearson Correlation Coefficient
Health literacy	High Adequate Adequate Not quite enough Inadequate	15(5.6) 99(37.1) 104(39) 49(18.4)	115.6	18.63	r = 0.326 p<0.001*
Lifestyle	High lifestyle Average lifestyle Low lifestyle	76(28.5) 187(70) 4(1.5)	69.5	9.60	

*Based on Spearman's correlation coefficient

Discussion

This study was conducted on 267 infertile participants referred to the molod Zahedan Infertility Center in order to investigate the relationship between health literacy and lifestyle. Various aspects of lifestyle play a key role in determining reproductive health and can have a negative or positive effect on fertility (14). This finding indicated that lifestyle had a significant relationship withBMI, duration of exercise, consumption of vegetable, sea food and nuts.

In line with our findings, other studies (15-17) indicated that consuming foods including vegetables and fortified grains, fish oil (omega 3), nuts and eating healthy monounsaturated fats instead of saturated and trans fats, improve the score of lifestyle.

On the other hand, results showed that the average lifestyle in participants with normal BMI is higher than others. This is consistent with another (18) study but in contrast with Mutsaerts study (19). This difference can be due to the sample size, area of study, type of infertility and the type of study.

Our results also showed that health literacy was associated with the variables of BMI, sleep quality, consumption of fruit, nuts, and sea food as well as consumption of vitamin C, D and E supplement. Our findings are compatible with the findings of previous reports (20-22). These results indicate that with the increase in the level of health literacy, the desire to eat healthy increases. In fact, healthy diets with more foods rich in fruits, fish, legumes, vegetables, nuts and seeds as well as consumption of vitamins and antioxidants including vitamins E, C, D, omega 3, zinc, selenium and Beta Carotene increase the fertility rate, especially among people who are under assisted reproductive technology (23). On the other hand, food behaviors such as unhealthy food consumption, irregular eating habits and unbalanced diet contribute to obesity. Also, overweight and obese participants in our study had low health literacy, and two other studies (24, 25) showed similar results. Therefore, based on evidence low levels of health literacy may be involved in the cause of obesity (26). Also, a similar report showed that, there was significant association between health literacy and sleep quality (27).

Generally, the findings of this investigation indicated that there was significant association between the health literacy level and lifestyle of infertile participants that is consistent with the other researches (28, 29).

With the increase in health literacy, people give more importance to their health, which leads to the improvement of their lifestyle. Therefore, improving health literacy skills and the level of knowledge and awareness of

people about a healthy lifestyle, including the expansion of healthy nutritional behaviors throughout life and promoting health literacy, an effective role in solving problems related to infertile couples and improving fertility in future societies.

Study Limitations and Strengths: This study had some limitations, the first one is self-report and psychological conditions of the participants during the answer the questions and the second limitation was the short duration of the study (cross sectional), considering the importance of healthy fertility and youth of the population, it is better to study in the form of a cohort. Due to the difference in lifestyle and health literacy in different regions, it is suggested to carry out this study in other parts of Iran.

The study's strength is its use of face-to-face interview technique, in which the researchers poses questions to establish a standard for patient communication.

Conclusion

Totally, the results of this research in infertile participants showed that the lifestyle andhealthliteracyhave a significant relationship with each other.

In addition, health literacy plays a role in many lifestyle factors (such as diet, sleep, weight) as risk factors for infertility in men and women. So, considering the importance of the role of education in promoting health literacy and the meaningful relationship between health literacy and the choice of healthy eating behaviors and lifestyle, education with different tools among infertile people is necessary to improve healthy fertility, which is one of the important priorities of society's health.

Therefore, taking actions aimed at combating infertility seems necessary for the health of each individual and society.

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Consent for publication: Not applicable.

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References

1- Zhu L, Zhou B, Zhu X, Cheng F, Pan Y, Zhou Y, et al. association between body mass index and female infertility in the United States: data from national health and nutrition examination survey 2013-2018. International journal of general medicine. 2022:1821-31. https://doi.org/10.2147/IJGM.S349874 PMid: 35221716 PMCid: PMC8865871

2- Sharma R, Biedenharn KR, Fedor JM, Agarwal A. Lifestyle factors and reproductive health: taking control of your fertility. Reproductive biology and endocrinology. 2013; 11(1):1-15. https://doi.org/10.1186/1477-7827-11-66 PMid: 23870423 PMCid:PMC3717046

3- Ricci S. Essentials of maternity, newborn, and women's health: Lippincott Williams & Wilkins; 2020.
4- Kharazi SS, Peyman N, Esmaily H. The relationship between maternal health literacy and nutritional dietary self-efficacy with pregnancy outcome. Journal of Midwifery and Reproductive Health. 2020;8(1):2058-68.
5- Carbone ET, Zoellner JM. Nutrition and health literacy: a systematic review to inform nutrition research and practice. Journal of the Academy of Nutrition and Dietetics. 2012; 112(2):254-65. https://doi.org/10.1016/j.jada.2011.08.042 PMid:22732460
6- Kilfoyle KA, Vitko M, O'Conor R, Bailey SC. Health literacy and women's reproductive health: a systematic review. Journal of women's health. 2016;25(12):1237-55. https://doi.org/10.1089/jwh.2016.5810 PMid:27564780 PMCid:PMC5175428
7- azizi n ns, habibnezhad s, khezerloo z, Ghasem zadeh n, hosseinzadeghan f. The comparative study of life style items between infertile and fertile couples at Urmia. Nursing And Midwifery Journal. 2019;17(6):463-72.
8- Ayaz-Alkaya S, Kulakçı-Altıntaş H. Nutrition-exercise behaviors, health literacy level, and related factors in adolescents in Turkey. Journal of School Health. 2021;91(8):625-31. https://doi.org/10.1111/josh.13057 PMid:34159591
9- Chang LC. Health literacy, self-reported status and health promoting behaviours for adolescents in Taiwan. Journal of clinical nursing. 2011;20(1-2):190-6. https://doi.org/10.1111/j.1365-2702.2009.03181.x PMid:20629822
10- Buja A, Rabensteiner A, Sperotto M, Grotto G, Bertoncello C, Cocchio S, et al. Health literacy and physical activity: a systematic review. Journal of Physical Activity and Health. 2020;17(12):1259-74. https://doi.org/10.1123/jpah.2020-0161 PMid:33129198
11- ROUHAFZA H, Akochakian S, Sadeghi M, FARDMOUSAVI A, KHEYRABADI GR, GHASEMI T. Investigating the relation between lifestyle and chronic obstructive pulmonary disease. 2006.
12- Montazeri A, Tavousi M, Rakhshani F, Azin SA, Jahangiri K, Ebadi M, et al. Health Literacy for Iranian Adults (HELIA): development and psychometric properties. Payesh (Health Monitor). 2014; 13(5):589-99.
13- Roohafza H, Akochakian S, Sadeghi M, Fardmoosavi A, Khairabadi G, Ghasemi H. Investigating the relation between lifestyle and chronic obstructive pulmonary disease. Journal of Guilan University of Medical Sciences. 2006;15(59):32-7.
14- Emokpae MA, Brown SI. Effects of lifestyle factors on fertility: practical recommendations for modification. Reproduction & Fertility. 2021;2(1):R13. https://doi.org/10.1530/RAF-20-0046 PMid:35128442 PMCid:PMC8812443
15- M Omar Masoud A, Mohamed Ahmed Madkour A, Yahya Abdelrhman M, Gaber Zaghloul M, Mostafa Abd Elzaher O, Ahmed Abdelhafez A. Effect of Maternity-Led Pro-Fertility Lifestyle Intervention on Health-Promoting Behaviors of Women undergoing Infertility Treatment. Egyptian Journal of Health Care. 2023;14(1):1042-56. https://doi.org/10.21608/ejhc.2023.293041
16. Nayeri SD, Alahverdi F, Nayeri SD, Shahbaztabari N. A Review of the Effects of Lifestyle and Nutrition on Infertility in Couples. International Journal of Health Sciences. (I):310-23. https://doi.org/10.53730/ijhs.v6nS1.4757
17. Balanian S, Eftekhar M, Forghani H, Rahaei Z. Relationship Food Consuming Oxidative Stress and Antioxidant with Female Infertility: A Case-Control Study "Food Oxidative Stress and Antioxidant Stress and Infertility". Medical Research. 2019;1(1):1-6. https://doi.org/10.35702/mrj.10002
18. Cong J, Li P, Zheng L, Tan J. Prevalence and risk factors of infertility at a rural site of Northern China. PloS one. 2016;11(5):e0155563. https://doi.org/10.1371/journal.pone.0155563 PMid:27177147 PMCid:PMC4866679
19- Mutsaerts MA, Van Oers AM, Groen H, Burggraaff JM, Kuchenbecker WK, Perquin DA, et al. Randomized trial of a lifestyle program in obese infertile women. N Engl J Med. 2016;374:1942-53. https:// doi.org/10.1056 /NEJMoa1505297 PMid:27192672
20- Klinker CD, Aaby A, Ringgaard LW, Hjort AV, Hawkins M, Maindal HT. Health literacy is associated with health behaviors in students from vocational education and training schools: a Danish population-based survey. Int J Environ Res Public Health. 2020;17(2):671. https://doi.org/10.3390/ijerph17020671 PMid:31968667 PMCid:PMC7014204
21- Park A, Eckert TL, Zaso MJ, Scott-Sheldon LA, Vanable PA, Carey KB, et al. Associations between health literacy and health behaviors among urban high school students. Journal of School Health. 2017;87(12):885-93. https://doi.org/10.1111/josh.12567 PMid:29096408 PMCid:PMC5669371
22- Shawe J, Patel D, Joy M, Howden B, Barrett G, Stephenson J. Preparation for fatherhood: A survey of men's preconception health knowledge and behaviour in England. PLoS One. 2019;14(3):e0213897. https://doi.org/10.1371/journal.pone.0213897 PMid:30893380 PMCid:PMC6426231
23- Bold J, Swinburne D. Pre-conceptual guidelines for men: a review of male infertility experience, including nutrition and lifestyle factors. Dietetics. 2022;1(3):164-81. https://doi.org/10.3390/dietetics1030016
24- Michou M, Panagiotakos DB, Costarelli V. Low health literacy and excess body weight: a systematic review. Central European journal of public health. 2018 Sep;26(3):234-41. PubMed PMID: 30419628. Epub 2018/11/13. eng. https://doi.org/10.21101/cejph.a5172 PMid:30419628
25- Lam LT, Yang L. Is low health literacy associated with overweight and obesity in adolescents: an epidemiology study in a 12-16 years old population, Nanning, China, 2012. Archives of public health = Archives belges de sante publique. 2014 Apr 1;72(1):11. PubMed PMID: 24685203. Pubmed Central PMCID: PMC3994214. Epub

2014/04/02. eng. https://doi.org/10.1186/2049-3258-72-11 PMid:24685203 PMCid:PMC3994214

26- Michou M, Panagiotakos DB, Costarelli V. Low health literacy and excess body weight: A systematic review. Central European journal of public health. 2018;26(3):234-41. https://doi.org/10.21101/cejph.a5172

27- Jafari A, Tavassoli E. The relationship between health literacy and general health of staff of Isfahan University of Medical Sciences. Journal of Health Literacy. 2020;5(1):23-31.

28- Wang C, Kane RL, Xu D, Meng Q. Health literacy as a moderator of health-related quality of life responses to chronic disease among Chinese rural women. BMC women's health. 2015;15(1):1-8. https://doi.org/10.1186/s12905-015-0190-5 PMid:25887361 PMCid:PMC4399716

29- Kooshyar H, Shoorvazi M, Dalir Z, Hosseini M. Health literacy and its relationship with medical adherence and health-related quality of life in diabetic community-residing elderly. Journal of Mazandaran University of Medical Sciences. 2013;22(1):134-43.