BJFS Bangladesh Journal of Fertility & Sterility

Bangladesh J Fertil Steril, 2022;Vol.2(1):11-15 Original Article

Geographical Impact on Semen Parameter: A Study in a Tertiary Infertility Centre at Dhaka

Parveen Fatima[1], Homaira Bushra Hossain[2], Homaira Nowren Hossain[3], Fahim Abrar Hossain[4]

Abstract

Introduction: Male infertility has become a serious concern for public health professionals, worldwide. In developing countries infertility rate is higher than the developed country.

Objective: Our aim was to assess geographical impact on semen parameter.

Methodology: This was a descriptive cross sectional study conducted among the 200 patients in Care hospital, Dhaka, Bangladesh during the period from June 2019 to June 2020.Two hundred (200) infertile patients were selected as study participants, purposively. Data were collected from hospital record book.

Result: The mean age was 36.14 ± 5.32 years and the mean BMI was 25.18 ±4.44. The highest no of patients104 (52%) were in the 35 to 44 years group and the lowest no of patients 2(1%) were in 55 to 64 years group. Among the 200 patients 127(63.5%) were from outside of Dhaka and 73(36.5%) patients were from Dhaka city. And the semen profile of the patients from Dhaka city showed a slightly lower difference from patients of outside of Dhaka city. The mean age of the patients from Dhaka city was 35.21± 5.32.The mean total sperm count was 65.09 ±39.42 and the mean sperm motility was 37.15 ±22.47 which is comparatively higher than the patients from outside of Dhaka city.

Conclusion: Our results indicate that the Patients from outside of Dhaka city had lower semen parameter profiles in relation to sperm count, motility, abnormal morphology and percentage of dead sperm. These results indicate that environmental factors could play a major role in the causes of male infertility. Further studies would need to be performed to determine a potential treatment for these patients.

Keywords: Male infertility, Geographic region, Semen profile.

Introduction

Infertility is a concern affecting couples including loss of status within the family and community. About 20% men could suffer worldwide from fertility problems and the rising level of male infertility has become a serious trepidation for public health[1]. Fertility has been the main study of civilization since immemorial time but the progression is rather sluggish. Infertility can be defined as the incapacity to fulfill pregnancy after 12 months of unprotected sex[1, 2]. Global data confirms that male are to be responsible either fully or partially for 35-40% cases of infertility, while female partners are responsible for 35-40% and the remaining 20-30% is the combination of couples and a small percentage of unknown causes[1]. Generally, infertility risk factors particularly for the case of male may append by gland infection, mumps orchitis, varicocele and cryptorchidism[3,4].Common causes of male infertility include low sperm counts; abnormal morphology (shape and size of sperm), slow sperm motility (movement) and related problems with semen[1]. Several studies have demonstrated that hazardous effect by environmental factors such as toxic substances radiation and pesticides can affect the male reproductive function[5]. The abuse of tobacco, alcohol and caffeine also has been seen as a way of linkage with male infertility[6,7,8]. In Bangladesh, infertility remains a neglected issue due to overpopulation. Poverty, lifestyle, tuberculosis, malnutrition and anemia and reproductive tract infection are also the main risk factors of infertility. Sexual transmitted diseases (STD), late marriage, improper medication and general hygienic condition are also the causes of infertility

1. Chairman, CARe Medical College Hospital and Ex-Professor and Chairman, Department of Reproductive Endocrinology and Infertility, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh
2. Assistant Professor, Department of Gynaecology and Obstetrics, CARe Medical College Hospital, Dhaka, Bangladesh
3. Registrar, Department of Gynaecology and Obstetrics, CARe Medical College Hospital, Dhaka, Bangladesh
4. Lecturer, Department of Community Medicine, CARe Medical College Hospital, Dhaka, Bangladesh

Corresponding Author: Professor Parveen Fatima, Chairman, CARE Medical College Hospital and Ex-Professor and Chairman, Department of Reproductive Endocrinology and Infertility, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, Email: drpfatima@gmail.com

Date of Submission: 03-03-2021 | Date of Acceptance: 16-08-2021

in Bangladesh. However, the intensities of risk factors for male infertility in different countries and regions vary and the identification of major risk factors in any particular country would have importantly significant to public health. In developing countries, patterns of infertility are quite different from those in developed countries and the incidence of preventable infertility is much higher in developing countries[9]. Many cases of male infertility require sophisticated and expensive treatment. Therefore, the addressing the issue of male infertility appears to be one of the priority tasks of infertility programmes in the developing countries; Bangladesh is not an exception. Traditionally, the major focuses of fertility problems in the past have been the female partners. Infertility as a socio medical problem can be considered in Bangladesh because male infertility adversely and negatively causes family unrest, multiple marriages, divorce and even sometime suicide. There are about three million couples in Bangladesh are infertile and it is increasing rapidly changing in socio economic norm. Unfortunately like other developing nations, wives in Bangladesh are mostly blamed albeit husbands are responsible for 60% happenings

Objective

To semen parameter the impact of geographical region on infertility.

Methodology

This was a descriptive cross sectional case study conducted among the 200 patients in Care hospital, Dhaka, Bangladesh during the period from June 2019 to June 2020. A total no of 200 male patients who were diagnosed with infertility were selected as study participants. Purposive sampling technique was followed. All the findings were collected from the patient's record. The inclusion criteria for case group Couples with "pure" male factor infertility of six months or more, defined as not pregnant in spite of being desirous of pregnancy for one year or more with normal sexual activity and no birth control. Primary and Secondary infertility included. Descriptive statistical analysis has been carried out in the present study. The statistical data analysis was done using SPSS software version 23.0 for Windows.

Inclusion criteria

- Couples with "pure" male factor infertility of one year or more, defined as not pregnant in spite of being desirous of pregnancy for at least six months with normal sexual activity and no birth control. Primary and Secondary infertility included.
- Abnormality of any one of the sperm parameters according to WHO or Kruger for concentration, motility or morphology.
- Age between 25 to 55 years.
- Candidate for ICSI treatment.

Exclusion criteria

- Abnormal karyotype.
- Y micro deletion.
- Semen infection.
- CFTR gene mutation.
- Anti-sperm antibodies

Results

The study was conducted among the 200 infertile patients. The highest no of patients104 (52%) were in the 35 to 44 years group and the lowest no of patients 2(1%) were in 55 to 64 years group.[Table 1] Study shows that the highest number 127 (63.5%) were from outside of Dhaka which is almost double 73 (36.5%) from Dhaka . [Table-2] The mean age of the patients from Dhaka was 35.21± 5.32 whereas the mean age of the patients from outside Dhaka was 36.73 ± 5.80. The mean sperm total count, counted from the patients of Dhaka was 65.09 ±39.42 and the mean sperm counted from the patients of outside Dhaka was 62.19±43.93. The mean sperm motility counted from the patients of Dhaka was 37.15±22.47; on the contrary, the mean sperm motility counted from the patients of outside Dhaka was 35.30 ±21.73 which is comparatively lower than the patients from Dhaka. The mean RL (%) counted from the patients of Dhaka was 18.81±14.02, whereas the mean RL (%) counted from the patients of outside Dhaka was 18.70±14.36. The mean SL (%) counted from the patients of Dhaka was 8.13 ±4.48, and the mean SL (%) counted from the patients of outside Dhaka was 7.40 ±4.47. The mean NP (%) counted from the patients of Dhaka was 5.15±2.67, but the mean NP (%) counted from the patients of outside Dhaka was 4.42±1.63. The mean Morphology (%) counted from the patients of Dhaka was 24.59±20.14,whereas the mean Morphology (%) counted from the patients of outside Dhaka was 25.21±22.56,which was comparably higher than Dhaka.[Table-3] 10.5% patients were smoker in Dhaka, whereas 15.5% patients were smoker in outside Dhaka, which was higher than Dhaka (Table-4).

Table: 1 Age distribution of the patients (n=200)

Age	Frequency	Percent
25-34	80	40
35-44	104	52
45-54	14	7
55-64	2	1
Total	200	100

Table 2: Distribution of study participants in different geographical location. (n=200)

		Frequency	Percent
Valid	Dhaka	73	36.5
	Outside Dhaka	127	63.5
	Total	200	100

Table 3: Distribution of total sperm count in different geographical locations. (n=200)

Variables	Dhaka	Outside Dhaka
Age	35.21 ± 4.20	36.73 ± 5.80
Semen test: Count (million)	65.09 ±39.42	62.19 ±43.93
Semen test: Motility (%)	37.15 ±22.47	35.30 ±21.73
Semen test: RL (%)	18.81±14.02	18.70±14.36
Semen test: SL (%)	8.13 ±4.48	7.40 ±4.47
Semen test: NP (%)	5.15±2.67	4.42±1.63
Semen test: Morphology (%)	24.59±20.14	25.21±22.56

Table 4: shows the smoking habits of the patients from Dhaka city and outside of the Dhaka city. (n=200)

Area	Frequency	Percentage
Dhaka	21	10.5%
Outside Dhaka	31	15.5%

Discussion

Geographical variations in fertility have been observed within several countries in the globe, with higher fertility in rural areas, smaller settlements and city suburbs. It is known that environmental conditions and lifestyle factors might play pivotal roles in sperm disorders[10-12].In the past few decades, numerous studies have presented indications of a time-based decline in semen quality from different parts of the world[13-15]. The findings of these studies seem to differ down to the geographical locations of the representative male populations[16, 17]. Studies have reported differences in European countries[18-22]. Higher fertility rates have been recorded in men from Finland than in Britain and Denmark[18,19]. Swedish men have also showed higher semen volume and sperm concentration than Danish men[20]. Moreover, a comparative study on semen quality among several European cities has shown highest sperm counts in Turkey, Finland, while the highest sperm motility was reported in Edinburgh, Scotland[21] Correspondingly, among the Asian countries, slight differences were reported in semen characteristics among Japanese and Indian men[12, 23]. A similar report on semen quality among North American men showed a significant difference in semen parameters between different regions[24]. Regional differences have also been reported in Spain[22], Switzerland[25], Denmark[18] and Canada[26]. Although most of the studies did not investigate the underlying causes for these differences, it is postulated that disparities in lifestyle patterns, ethnicity and environmental, occupational and economic factors may all contribute[10-12] The decrease in semen parameters in industrialised countries has also received much attention in recent years[27]. Thus, environmental and lifestyle factors may potentially contribute to the geographical differences in semen characteristics[28]. As one of the conceivable factors, environmental pollutants in the industrialised countries implicate as an aetiological factor of testicular dysfunction and poor sperm production[29, 30]. Previous studies showed strong negative correlations between semen characteristics and pollutants[27]. Lifestyle factors and environmental toxins may play pivotal roles in the generation of oxidative stress, which affects spermatozoa[28]. In response to elevated seminal oxidants, extracellular antioxidants may increase to reduce sperm damage[30]. Very little study is available on geographical regional variation on infertility in Bangladesh. The current study showed the semen quality of the patients from Dhaka city and outside of the Dhaka city. Our results indicate that the Patients from outside of Dhaka city had lower semen parameter profiles in relation to sperm count, motility, abnormal morphology and percentage of dead sperm. Among the 200 infertile patients the highest number 127 (63.5%) are from outside of the Dhaka which is almost double 73 (36.5%) from Dhaka city. The results obtained in this study regarding the smoking behavior in the Bangladesh are inconsistent most probably due to the small sample size. Therefore, further larger-scaled studies are necessary focusing particularly on the influence of smoking upon semen parameters in different populations[25] and thereby level out this obvious confounding factor. As indicated, the age of the Dhaka city population was also slightly higher than that of the outside of Dhaka study population. Available evidence suggests that advanced male age is associated with a decline in semen quality [30]. These results demonstrate that environmental and lifestyle factors might be the predominant influences over the semen characteristics. Thus, the present study reports differences in semen qualities between Dhaka city and outside of Dhaka city in Bangladesh and finds its significance in providing an overview of how the semen qualities of the two populations may differ owing to variations in geographic locations and possible environmental and lifestyle factors, comparing between a highly industrial area, over polluted Dhaka city and outside of Dhaka city in Bangladesh. Since the study has used small sample sizes of the populations, further interventions using larger sample sizes are necessary to support the findings.

Limitation of the study

As this study was a single centre study, this study may not depict the scenario of semen quality of the whole country. So, multi centered study will be recommended with a large sample size and lengthier period of time.

Conclusion

Among numerous other confounding factors, variations in male fertility parameters in different regions have repeatedly been suggested to be influenced by geographic locations. The impact of overall lifestyle, behavioral patterns, ethnicity, work stress and associated factors upon health differ greatly between Dhaka city and Outside of Dhaka city in Bangladesh. These factors, individually or in combination, affect male reproductive functions ensuing the discrepancies in semen qualities in connection with geographic variations .Our results indicate that the Patients from outside of Dhaka city had lower semen parameter profiles in relation to sperm count, motility, abnormal morphology and percentage of dead sperm. These results indicate that environmental factors could play a major role in the causes of male infertility. Further studies would need to be performed to determine a potential treatment for these patients.

Source of Fund: Nil
Conflict of Interest: None

How to Cite this Article: Fatima P, Hossain HB, Hossain HN, et. al. Geographical Impact on Semen Parameter: A Study in Tertiary Infertility Centre, Dhaka. *Bangladesh J Fertil Steril*; 2022; 2(1): 11-15

References

1. Orbiclinic, 2011. Infertility in men is increasing. San Francisco, CA 94104, USA.
2. Guariguata L, Whiting DR, Hambleton I, Beagley J, Linnenkamp U, et al. Global estimates of diabetes prevalence for 2013 and projections for 2035. Diabetes Res Clin Pract. 2014; 103:137–49.
3. Eizirik DL, Colli ML, Ortis F. The role of inflammation in insulitis and beta-cell loss in type 1 diabetes. Nat

Rev Endocrinol. 2009; 5:219–26.
4. Butler AE, Janson J, Bonner-Weir S, Ritzel R, Rizza RA, et al. Beta-cell deficit and increased beta-cell apoptosis in humans with type 2 diabetes. Diabetes. 2003; 52:102–10.
5. Kahn SE, Hull RL, Utzschneider KM. Mechanism's linking obesity to insulin resistance and type 2 diabetes. Nature. 2006; 444:840–6.
6. Risérus U, Willett WC, Hu FB. Dietary fats and prevention of type 2 diabetes. Prog Lipid Res. 2009; 48:44–51. Vannucci RC, Nardis EE, Vannucci SJ (1980) cerebral metabolism during hypoglycemia and asphyxia in newborn dogs. BiolNeonate 38:276–286
7. Association AD. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2010; 33:S62–9. Dutta DC, Konar H (1998) Diseases of the fetus and the newborn.In: Dutta DC, Konar H (eds) Text book of obstetrics includingperinatology and contraception, 4th edn. New Central BookPublisher, Calcutta, pp 504–505
8. Alasandro M, Wiesler D, Rhodes G, Nevotny M (1982): Quantitative alterations of steroid urinary profiles associated with diabetes mellitus. Clinica Chimica Acta 126243
9. Agbaje IM, Rogers DA, McVicar CM, McClure N, Atkinson AB, et al. Insulin dependant diabetes mellitus: implications for male reproductive function. Hum Reprod. 2007; 22:1871–7.
10. Orbiclinic, 2011. Infertility in men is increasing. San Francisco, CA 94104, USA.
11. Iwamoto, T., Nozawa, S., Yoshiike, M., Namiki, M., Koh, E., Kanaya, J., Jørgensen, N. (2013). Semen quality of fertile Japanese men: A cross-sectional population-based study of 792 men. British Medical Journal Open, 3(1), https ://doi.org/10.1136/bmjop en-2012-002223
12. Levine, R. J. (1999). Seasonal variation of semen quality and fertility.Scandinavian Journal of Work, Environment & Health, 25, 34–37.
13. Agarwal, A., Saleh, R. A., & Bedaiwy, M. A. (2003). Role of reactive oxygen species in the pathophysiology of human reproduction. Fertility and Sterility, 79(4), 829–843. https ://doi.org/10.1016/ S0015-0282(02)04948-8
14. Carlsen, E., Giwercman, A., Keiding, N., & Skakkebaek, N. E. (1992). Evidence for decreasing quality of semen during past 50 years. BMJ, 305(6854), 609–613.
15. Rolland, M., Le Moal, J., Wagner, V., Royere, D., & De Mouzon, J. (2013). Decline in semen concentration and morphology in a sample of 26,609 men close to general population between 1989 and2005 in France. Human Reproduction, 28(2), 462–470. https ://doi. org/10.1093/humre p/des415
16. Khandwala, Y. S., Zhang, C. A., Li, S., Behr, B., Guo, D., & Eisenberg, M. L. (2017). Racial variation in semen quality at fertility evaluation.Urology, 106, 96–102. https ://doi.org/10.1016/j.urolo gy.2017.03.064
17. Paulsen, C. A., Berman, N. G., & Wang, C. (1996). Data from men in greater Seattle area reveals no downward trend in semen quality: Further evidence that deterioration of semen quality is not geographically uniform. Fertility and Sterility, 65(5), 1015–1020
18. Jensen, T. K., Vierula, M., Hjollund, N., Saaranen, M., Scheike, T., Saarikoski, S., & Skakkebæk, N. E. (2000). Semen quality among Danish and Finnish men attempting to conceive. The Danish first pregnancy planner study team. European Journal of Endocrinology,142(1), 47–52
19. Joffe, M. (1996). Decreased fertility in Britain compared with Finland.The Lancet, 347(9014), 1519–1522.
20. Jørgensen, N., Andersen, A.-G., Eustache, F., Irvine, D. S., Suominen, J., Petersen, J. H. Skakkebæk, N. E. (2001). Regional differences in semen quality in Europe. Human Reproduction, 16(5), 1012–1019.
21. López-Teijón, M., Elbaile, M., & Alvarez, J. (2008). Geographical differences in semen quality in a population of young healthy volunteers from the different regions of Spain. Andrologia, 40(5), 318–328.
22. Richthoff, J., Rylander, L., Hagmar, L., Malm, J., & Giwercman, A. (2002). Higher sperm counts in Southern Sweden compared with Denmark. Human Reproduction, 17(9), 2468–2473.
23. Mehta, R. H., Makwana, S., Ranga, G. M., Srinivasan, R., & Virk, S. (2006). Prevalences of oligozoospermia and azoospermia in male partners of infertile couples from different parts of India. Asian Journal of Andrology, 8(1), 89–93.
24. Swan, S. H., Brazil, C., Drobnis, E. Z., Liu, F., Kruse, R. L., Hatch, M., Overstreet, J. W. (2002). Geographic differences in semen quality of fertile U.S. Males. Environmental Health Perspectives, 111(4), 414–420.
25. Crausaz, M., Vargas, J., Parapanov, R., Chollet, Y., Wisard, M., Stettler, E.Germonda, M. (2008). First evaluation of human sperm quality in various geographic regions of Switzerland. CHIMIA International Journal for Chemistry, 62(5), 395–400.
26. Younglai, E. V., Collins, J. A., & Foster, W. G. (1998). Canadian semen quality: An analysis of sperm density among eleven academic fertility centers. Fertility and Sterility, 70(1), 76–80.
27. Sheiner, E. K., Sheiner, E., Hammel, R. D., Potashnik, G., & Carel, R. (2003). Effect of occupational exposures on male fertility: Literaturereview. Industrial Health, 41(2), 55–62.
28. Mocarelli, P., Gerthoux, P. M., Needham, L. L., Patterson, D. G., Limonta, G., Falbo, R., Brambilla, P. (2011). Perinatal exposure to low doses of dioxin can permanently impair human semen quality. Environmental Health Perspectives, 119(5), 713–718.
29. Sengupta, P. (2013). Environmental and occupational exposure of metals and their role in male reproductive functions. Drug and Chemical Toxicology, 36(3), 353–368. https ://doi.org/10.3109/01480545.2012.710631
30. Jurewicz, J., Hanke, W., Radwan, M., & Bonde, J. P. (2009). Environmental factors and semen quality. International Journal of Occupational Medicine and Environmental Health, 22(4), 305–329. https ://doi. org/10.2478/v10001-009-0036-1