Comparative Study On Occurrence Of Menstrual Disorders Among Female Air Cabin Crew Members And Pharmaceutical Company Workers - A Review

Olivia. F
Assistant Professor, Department of Nutrition and Dietetics, EGS Pillay Arts and Science College (Autonomous),
Nagapattinam, Tamilnadu, India

E-mail: francisvinola23@gmail.com

Abstract

Identifying issues and problems in the occupational health of women remains a challenge. Plenty of evidences shows that working condition influences the human health, but a lot of the occupational health literature is based on cohorts of men in male-dominated occupations. Women's occupations are thus fluid and multi-dimensional. A simple occupational category is seldom sufficient as a basis for establishing a specific health risk. Recognizing and understanding the relationships between the health hazards on the job and development of disease in women workers is challenging for many methodological and practical reasons. Many occupational diseases and disorders are chronic, meaning that they take long years of exposure to manifest themselves. Exposures may not be completely identified and they may change well before the disease becomes apparent. If health problems are identified among women workers, too often they are attributed to unfitness for the job, to hormonal factors or to the likelihood that women will just be complaining without the real cause. The aim of the present study was to determine the incidence of menstrual disorders among female flight cabin crew members as well as the female pharmaceutical workers. Air crew members are exposed to elevated levels of cosmic ionizing radiation of galactic and solar origin, also galactic cosmic radiation generates secondary and tertiary radiation at aircraft altitudes, including neutrons and energetic photons , carcinogen solar particle events (transient solar surface eruptions) are another source of cosmic radiation exposure. Flying across time zones or working during normal sleep hours, performing strenuous task, experiences more menstrual and reproductive disorders among these populations. These exposures are different from those of other occupational groups exposed to terrestrial radiation or other shift workers. On the other hand, in pharmaceutical industry solvent use is more common and workers exposed to various types of organic solvents may be associated with increased risk of menstrual disorders and hormonal changes. This study highlights the link to find the significant association between, female cabin crew members and pharmaceutical workers, among these population who were more prominent to experience more menstrual and other reproductive disorders due to their occupational exposures. The number of women workers is increasing worldwide and a considerable proportion of them are of reproductive age. Therefore attention to effects of occupational exposures on reproductive system is required. Encouraging a good dietary practices, alongside promoting hydration and

balanced simple meals, can help to address these challenges. By focusing on their health with proper nutrition is not just a necessity, it is a foremost step towards the women to empower in safe and healthiest occupational sector.

Keywords: Occupational health, Pharmaceutical workers, Organic solvent exposure, Air cabin crew workers, Cosmic Ionizing Radiation exposure, Menstrual disorders.

I. INTRODUCTION

Occupational health is a branch of community medicine which deals with the effects of occupation or workplace on human health [1]. Every occupation is associated with one or more other ill effects on health. Occupational safety and health (OSH) is the study of workers' wellbeing and the factors that affect it causing hazards like injuries, illnesses, and fatalities worldwide in a broader sense [2].They affect not only the worker but also his family and significant others and his community [3]. When compares to male workers female workers need more nutritious foods to remain healthy and productive due to their following stages like menstruation, pregnancy, and lactation. While in this case, when women who were indulging in occupation are one step forward in requiring higher nutritious foods and good health to combat both. The importance of adequate nourishment for general health and work productivity hardly needs emphasis. This study focuses the two major occupations like the female air cabin crew members and pharmaceutical workers. The number of women workers is increasing worldwide and a considerable proportion of them are of reproductive age. Therefore attention to effects of occupational exposures on reproductive system is required [4].

Menstruation normally occurs within 22- 35 days. Disorders in the menstruation generally occurs in the early period and the final period of the reproductive period, namely under the age of 19 years and above the age of 39 years. Disorders that occur can be related to the menstrual cycle, the duration of the menstrual cycle, and the amount of bleeding that occurs during the menstrual phase. [5]. Menstrual disturbances are abnormal menstrual bleeding in terms of the length of the menstrual cycle, the length of menstruation, and the amount of menstrual blood which involves the hypothalamus, pituitary, ovaries and endometrium . Menstrual disturbance is a gynecological problem that may occur before and after menstruation period, including premenstrual syndrome, dysmenorrhea, polymenorrhea or menstrual cycles of less than 21 days, oligomenorrhea or menstrual cycles of more than 35 days, amenorrhea or no menstruation for 3 months or more, menorrhagia or a lot of blood volume and a long duration and metroraghia, and the last irregular bleeding. This will have an impact on the function of the reproductive system which is associated with an increasing risk of various diseases such as uterine and breast cancer, cardiovascular disorders and the possibility to be difficult to get children or infertile [6].

Also, menstrual disturbances can be caused by several influencing factors, for example, the exposure to the work environment of flight

attendants such as cosmic radiation and circadian rhythm disturbances or flying across various time zones and working past normal time hours for rest and sleep which can affect reproductive hormones [7].The following major factors were involving in menstrual disturbances among female air cabin crew members.

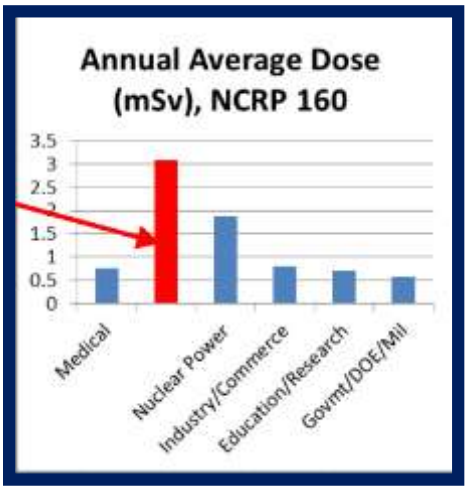
II. Time duration

The average flight duration for a flight attendant with other cabin crew is around 9 hours per day and the maximum limit of working hour (duty time or flight duty time) for all cabin crew is 14 hours of work per day. Generally in 1 week a flight attendant flies 3 times. Accordingly, the average of flying hour is 30 hours/week, 110 hours/month, 225 hours/3 months, and 1,050 hours/year [8]. A flight attendant who works beyond the flight duty time can result in menstrual disorders that interfere with the performance of the flight attendant in carrying out the work. Moreover, the other problems are the exposure to cosmic radiation, disruption of circadian rhythms or flying across multiple time zones, and working beyond the normal hours that interferes with the time for rest and sleep. These problems may affect the reproductive system such as problems with the menstrual cycle, and it may interfere with the performance of a flight attendant in carrying out the work that then can affect flight safety .A Flight attendant has a higher risk of menstrual disturbances than a non-flight crew. Moreover, a flight attendant has high work pressure with flight duration of 225 hours (3 months) which will cause work stress and menstrual disturbance [9].

III. Exposure to Cosmic Radiation

In addition, as a flight attendant, there are unique problems related to exposure to the work. A flight attendant is consistently exposed to cosmic radiation, ionic radiation, and circadian rhythm disturbance (working beyond normal hours that interfere with the time to rest and sleep). Therefore, this can affect reproductive hormones that if FSH (Follicle Stimulating Hormone) and LH (Luteinizing Hormone) are disrupted, it will affect the production of estrogen and progesterone which can cause the menstrual disturbances [10]. Cosmic radiation dose rates are considerably higher at cruising altitudes of airplanes than at ground level. Aircraft cabin personnel have unique working conditions. Their work is often shift work with a possibility of flights over different time zones which can cause circadian disruption. Aircraft cabin is pressurized when flying at cruising heights with a probability to hypoxia. In addition, the cabin has a very low relative humidity. Cosmic radiation dose rates are considerably higher at cruising altitudes than at ground level. Therefore, The International Commission on Radiation Protection (ICRP) has recommended that aircrew should be classified as radiation workers (International Commission on Radiological Protection. 1991). Considering an occupational group with increased risk of certain cancers, it is very important to assess whether the increased risk is related to occupational exposure. If this is the case, guidance and work protection standards are important intervention strategies. Human exposure to ionizing radiation can originate from natural (e.g. radon) or man-made source (e.g. medical exposures) and it can be external (i.e. radiation from outside the

body) or internal (i.e. radioactive material is inside the body). The stochastic harmful health effects of radiation might depend also on the exposure dose rate, i.e., whether the exposure is brief (atomic bombs) or protracted (occupational) despite of the total dose. The relative biological effectiveness describes the ability of radiation to induce biological outcomes such as chromosomal damage or cancer [11].



CDC workplace safety and health (National Institute for Occupational Safety and Health [12]

IV.Environmental changes

On other hand, causing menstrual disturbances among female air cabin crew members are environmental change, that is, travelling, can alter the menstrual cycle. If the alteration occurs in the pre ovulatory phase of the cycle, the ovulation is either inhibited or delayed and the menstruation is postponed. There is no effect due to environmental change if it occurs in the postovulatory phase. Some studies have suggested that female cabin crew suffer from various types of disturbances of menstrual cycle. Health problems among the Norwegian Scandinavian Airlines (SAS) cabin crew and found that more than 30% of the crew reported experiencing sometimes or often dysmenorrhoea, i.e., painful periods [13]. More than 20% indicated irregular menstrual cycle. The differences between the short-haul and the long-haul personnel were not statistically significant. The prevalence of these menstrual problems in general Norwegian female population is not known. However, the authors state that cabin crews do not seem to have more menstrual problems than other Norwegian shift workers. Iglesias and co-workers studied menstrual disorders among the Mexicana Airline cabin crew [14]. After recruitment, 20% of the women reported hyperpolymenorrhoea, 17% dysmenorrhoea, 16% complete irregularity in menstrual cycle and 9% of hypo-olygomenorrhoea. Of these women, 24% reported that they had no previous the menstrual disorders prior to starting the work as a member of the cabin crew. In a study by Lauria and co-workers, it was noted that menstrual abnormalities of cabin crew members less than 40 years of age were more common among current than former cabin crew members (20.6% vs. 10.4%) [15].

The other occupation where female workers facing menstrual disturbances are pharmaceutical companies due to their exposure to the various types of chemicals / organic solvents. The Indian Pharmaceutical Industry is making enormous progress not only in the creation of excellence but also to meet the global requirements of providing quality medicines as well as getting into growing fields of research, production, and clinical trials as it is a highly regulated and R&D-driven industry.

Pharmaceutical industries also have many environmental problems, like the other chemical industries, especially in API manufacture [16 ,17] . Hazardous materials are chemicals that, if released or abused, can pose a threat to the environment or health. They include industrial chemicals, pesticides, agricultural chemicals, pharmaceuticals, cosmetics, and food chemicals that may be present at the workplace and "have a negative effect on a worker's health as a result of direct contact or exposure to the chemical substance." The first and fundamental step leading to the safe use of chemicals is knowledge of their identity, their health and environmental risks, and the means to control them. In addition, this intrinsically complex knowledge must be organized in such a way that key information on relevant risks and protection measures can be identified and transmitted to the user in an easy-to-understand manner [18].

Chemicals are among risk factors that can affect women's reproductive system [19]. Because of wide spread use of chemicals in industrial settings, exposure to such hazards is almost inevitable in workplaces [20]. Studies suggested that exposure to chemicals such as organic solvents and pesticides could affect different aspects of women's reproductive system such as fertility, menstrual cycle and ovulation [21]. In a study by Cho et al the exposure to organic solvents was associated with increased frequency of oligomenorrhea [22]. Exposure to organic solvents has been related to spontaneous abortion, stillbirth, miscarriage, and small for gestational age in pregnant women [23,24]. It is shown that exposure to 2- bromopropane in the workplace is associated with increased prevalence of secondary amenorrhea and elevated follicle stimulating hormone (FSH) and luteinizing hormone (LH) levels [25]. Also exposure to benzene, toluene, and cyclohexane may lead to irregular menstrual cycles [26]. The pharmaceutical industry employs more than 350 thousand people all over the world [27]. In pharmaceutical industry solvent use is common and consistently accounts for between 80 % and 90 % of mass utilization in a typical pharmaceutical batch chemical operation [28]. Considering that usually in industrial settings workers are exposed to a variety of organic solvents in each time, In human studies, occupational exposure to organic solvents has been related to menstrual disorders, reduced fertility, and adverse effects on pregnancy [29, 30]. In a study among Iranian female workers, it has been found that occupational exposure to organic solvents could be associated with adverse outcomes such as prolonged waiting time to pregnancy and increased frequency of spontaneous abortion [31]. Despite of widespread use of several thousand exogenous chemicals in industrial processes, our knowledge about the effects of such hazards on reproductive system is limited.

V.Conclusion

This review focused on two questions: if flight attendants have a higher prevalence of menstrual cycle irregularities than pharmaceutical workers. This addresses the epidemiological evidence regarding menstrual cycle irregularities among flight attendants, particularly related to factors like prolonged time duration, exposure to cosmic radiation on other hand, when it comes to pharmaceutical workers longer exposure to chemicals/organic solvents. While, flight attendants

factors are enormous in count when compares to pharmaceutical workers. This is because, the pharmaceutical workers falls under short term exposure in their work place results in normal regularities of menstrual cycle. Incase if the pharmaceutical workers exposed to prolonged period of time the hypothesis result can vary. While in flight attentandants, even their time duration (shorter) and an environmental change doesn't affect their menstrual regularities but, their exposure to cosmic radiation even for a shorter period of time results in menstrual irregularities. By choosing a wide variety of food groups and good dietary pattern, one can lead a healthy lifestyle and free from these menstrual disorders. Nutrition education will helps to impart a awareness on these factors and healthy eating patterns and balanced diet helps to combat this disorders. This knowledge must be available with an affordable cost and effort.

VI. Suggestion for future research

1. This study could be carried out for a longer period of time on a larger population.
2. The further research should extend the study on the basis of other factors indulging in these both occupation and prevention method.

References

[1] Park K, Park's text book of Preventive and Social Medicine 20th edition, 2009. pp.708–11.

[2] Fuller, T. P. Global occupational safety and health management handbook. 2019,CRC Press.

[3] Salazar, M. K. Core curriculum for occupational health nursing 1997 American Association of Occupational Health Nursing, Saunders Company.,(pp. 3–4).

[4] Kumar S. Occupational exposure associated with reproductive dysfunction in Occupational Health 2004; 46:1-19.

[5] Banjarnahor, H., A study on Menstrual cycle disorders , 2013.

[6] Gudmundsdottir, S. L., Flanders, W. D., Augested, L. B.,. A longitudinal Study Of Physical Activity And Menstrual Cycle Charactheristics In Healthy Norwegian. 2011. 163- 171.

[7] Darmadi K. Hubungan Antara Stresor Kerja Dengan Gangguan Daur Haid Pada Pramugari Epidemiological studies of cancer., 2003. pp;14

[8] Hammer, G. P., Blettner, M., & Zeeb, H. Epidemiological studies of cancer in aircrew. Radiation Protection Dosimetry, (2009). 136(4), 232–239.

[9] Grajewski, B., Whelan, E. A., Lawson, C. C., Hein, M. J., Waters, M. A., Anderson, J. L., MacDonald, L. A., Mertens, C. J., Tseng, C.U., II, R. T. C., & Luo, L. (2015). Miscarriage Among Flight

Attendants Barbara. HHS PublicAccess, 2(26),192–203.

[10] Baker, F. C., & Driver, H. S. Circadian rhythms, sleep, and the menstrual cycle. Sleep Medicine, 2007, 8(6), 613–622.

[11] KOJO Katja. Occupational cosmic radiation exposure and cancer in airline cabin crew, 2013.

[12] Barbara Grajewski,, CDC workplace safety and health. 2015 Ph.D.

[13] Haugli, L., Skogstad, A. & Hellesoy, O.H. "Health, sleep, and mood percep_tions reported by airline crews flying short and long hauls", Aviation, Space, and Environmental Medicine, 1994,vol- 65, no. 1, pp. 27–34.

[14] Iglesias, R., Terres, A. & Chavarria, A., "Disorders of the menstrual cycle in airline stewardesses", Aviation, Space, and Environmental Medicine, 1980, vol. 51, no. 5, pp. 518 520.

[15] Lauria, L., Ballard, T.J., Caldora, M., Mazzanti, C. & Verdecchia, A., "Reproductive disorders and pregnancy outcomes among female flight attendants", Aviation, Space, and Environmental Medicine, 2006, vol. 77, no. 5, pp. 533–539

[16] Dubey R. Hazard Management in Pharmaceutical Industry. Event Report and Material. 2010.Bhopal: Disaster Management Institute, Sponsored by Disaster Management Institute.

[17] Shabaninejad H, Madani H, Amineh ZA, Doostzadeh E. A framework for evaluation of pharmaceutical industry development in developing countries: 2016;9:50-4. /7527.

[18] Hazard Guidelines-Hazardous Material Spill. Ann Arbor: University of Michigan, Division

of Public Safety and Security; 2011. [19]Kumar S. Occupational exposure associated with reproductive dysfunction. J Occup Health 2004; 46:1-19.

[20] Attarchi MS, Ashouri M, Labbafinejad Y, Mohammadi S. Assessment of time to pregnancy and spontaneous abortion status following occupational exposure to organic solvents mixture. Int Arch Occup Environ Health 2012;85:295-303.

[21] Figa-Talamanca I. Occupational risk factors and reproductive health of women. Occup. Med (Lond) 2006;56:521-531.

[22] Cho SI, Damokosh AI, Ryan LM, Chen D, Hu YA, Smith TJ, et al. Effects of exposure to organic solvents on menstrual cycle length. J Occup Environ Med 2001;43:567-75.

[23] Xu X, Cho SI, Sammel M, You L, Cui S, Huang Y, et al. Association of petrochemical exposure with spontaneous abortion. Occup Environ Med 1998; 55(1):31-6.

[24] Wennborg H, Bodin L, Vainio H, Axelsson G. Pregnancy outcome of personnel in Swedish biomedical research laboratories. J Occup Environ Med 2000;42:438-4462.

[25] Kim Y, Jung K, Hwang T, Jung G, Kim H, Park J, et al. Hematopoietic and reproductive hazards of Korean electronic workers exposed to solvents containing 2-bromopropane. Scand J Work Environ Health 1996;22(5):387-91.

[26] Mikulandra O, Cala D, Markovic V, Zoric A. [Exposure to benzene and hematologic changes in workers at the Ina-Oki Drnisplast factory in Drnis]. Arh Hig Rada Toksikol 1993;44:321-6.

[27] Binks SP. Occupational toxicology and the control of exposure to pharmaceutical agents at work. Occup Med 2003;53:363-70.

[28] Constable DJC, Jimenez-Gonzalez C, Henderson RK. Perspective on solvent use in the pharmaceutical industry. Org Process Res Dev 2007;11:133-7.

[29] Lindbohm M-L. Effects of parental exposure to solvents on pregnancy outcome. J Occup Environ Med 1995;37:908–914.

[30] Sallme´n M, Lindbohm M-L, Kyyronen P, Nykyri E, Anttila A, Taskinen H, et al. Reduced fertility among women exposed to organic solvents. Am J Ind Med 1995;27:699–713.

[31] Attarchi MS, Ashouri M, Labbafinejad Y, Mohammadi S. Assessment of time to pregnancy and spontaneous abortion status following occupational exposure to organic solvents mixture. Int Arch Occup Environ Health 2012;85:295-303.