Asian Pacific Journal of Tropical Biomedicine

journal homepage: www.apjtb.com

Document heading doi:10.12980/APJTB.4.2014C586

The effects of exposure to pesticides on the fecundity status of farm workers resident in a rural region of Fars province, southern Iran

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PEER REVIEW

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Comments
This is a valuable research work in which authors have demonstrated that the proportion of couples having impaired fecundity with no history of using pregnancy prevention measures was 7.4% (P<0.05). About 6.3% of the studied population had offspring with congenital anomalies.
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ABSTRACT

Objective: To investigate the prevalence of fecundity and other reproductive problems among a group of farmers in Kavar district of Fars province, southern Iran.
Methods: A total of 268 randomly selected married male farm workers were investigated. A questionnaire was devised and validated [Cronbach's α-coefficient (0.81)]. Subjects were directly interviewed and the questionnaire forms were completed for them.
Results: The prevalence of current primary infertility among the studied population was about 7.4% (P=0.001). Similarly, 6.3% of farm workers had offsprings with congenital malformations. Finally, 1.5% and 9% of farmers' wives had a history of stillbirth and abortion, respectively. It was concluded that the prevalence of current primary infertility were higher among farm workers families than in the normal population (P<0.05). Additionally, stillbirth and spontaneous abortion were more common in the wives of farm workers than in the normal population, although the difference did not reach statistical significance.
Conclusions: These effects are likely to be attributed to the exposure of farm workers to pesticides.

KEYWORDS
Infertility, Male farmers, Pesticides exposure, Iran

1. Introduction

Human fecundity is a very sensitive process which can be influenced by many factors including parental age, maternal status, cigarette smoking, alcohol and coffee use, socio-economic class, genetic attributes, hormonal imbalance and exposure to pesticides[1]. All of these affect the reproductive capability of couples. One of the best documents asserting the impaired fecundity role of pesticides on males belongs to Swan and colleagues[2]. Impaired fecundity is an ever increasing global health problem whose prevalence has risen by 50% over the last 16 years[3].

Pesticide refers to one kind of any agent known as herbicide, fungicide, insecticide, fumigants or rodenticide. Adverse impact on fecundity among men has various reasons which include endocrine impairments, epigenetic variations and

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Foundation Project: This study was part of an approved research project (No. 4597) partially funded by the Shiraz University of Medical Sciences (SUMS).

Article history:
Received 13 Dec 2013
Received in revised form 15 Dec, 2nd revised form 20 Dec, 3rd revised form 28 Dec 2014
Accepted 20 Jan 2014
Available online 28 Apr 2014

genetic forms. Hormonal balance particularly that in sexual hormones is important in relation to fecundity process. Environmental disruptors of endocrine glands may impair hormonal balance which could result in fecundity impairment. A relatively high level of impairment caused by environmental factors is due to pesticides' exposure particularly among farm workers[4].

In developing countries, the deliberate and permanently non-selective use of various pesticides can affect the exposure and infiltration into different tissues of non-target organisms and mammals like humans leading to increased cancers and impaired fecundity. Since the use of pesticides in Iran is estimated to be about 20-25 kiloton per year, the rate of their usage is about 0.5% the rate at the worldwide level.

Several research studies have been reported on the occupational exposure to pesticides and their detrimental effect on human fecundity which may ultimately lead to delay in pregnancy without the use of preventive measures after 1 year (time-to-pregnancy, TTP), stillbirth or spontaneous abortion, low birth weight and growth impairments. A significant relationship between exposure to pesticides and TTP is observed[5]. Examples of the chronic effects of toxic chemicals on health include limb deformities (*e.g.* shortening of the limbs or phocomelia), reproductive defects, cancer, damaged immune defense system and disorders of the nervous system[2].

Studies have indicated that the effects of exposure to pesticides in agrarian environment on fecundity are not unambiguous. The relationship between occupational pesticides and birth weight, preterm birth, and sex ratio is often contradictory. Most studies have shown that there is a relationship between exposure to pesticides and a decline in fecundity. It also increases the risk of getting teratogenic offspring[2]. Studies on fecundity failures indicate that the risk of stillbirth and spontaneous abortion increases among women workers exposed to pesticides[6].

Considering the large volume of pesticides used annually in Iran and the fact that to the best of our knowledge no systematic studies have been carried out in this field in the region. The aim of this study was to determine the likely association between exposure to pesticides and the incidence of impaired fecundity, congenital anomalies, abortion and general reproductive health among farm workers in a rural area of Fars province, southern Iran.

2. Materials and methods

This cross-sectional study took place in Kavar district (52°43`41`` E, 29°11`32`` N at an altitude of about 1386 m above sea level) about 45 km to the south east of Shiraz, the capital city of Fars province in southern Iran, in 2010 (Figure 1). The sampling method was randomly performed on resident married male farm workers. Sampling selection involved visits to the local health houses and survey of those household files with farming job. From these, a total number of 268 individuals were randomly selected. They were located in the field and interviewed on site and a questionnaire was completed by them.

Figure 1. Map of Iran indicating the location of the study area in Kavar region situated in Fars Province, Iran.

This questionnaire form included data whose reliability and validity were authenticated based on the Cronbach's α-coefficient and using the statistical software SPSS version 16 by researchers. This form included four sections: personal attributes of individuals under study including age and literacy level; occupational attributes including job history and the frequency of spraying pesticides per year; used pesticide characters including name of pesticide, use of protective equipments during spraying, illness status due to pesticides and visit to health houses; and ultimately miscellaneous questions section which included smoking habit, use of family regulation tools, presence of disabled individual in the house, and other