

Skin Problems among Farmers Engaged in Wastewater-Fed Agriculture in Namdinh Province, Vietnam

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Introduction

Like in many other developing countries, the use of wastewater in agriculture is a traditional practice in Vietnam. While farmers benefit from the agriculture and aquaculture production (Siebe & Cifuentes 1995; van der Hoek *et al.* 2002; Trang *et al.* 2003), wastewater also poses potential health hazards to its users. Several studies have particularly highlighted the risk of parasitic infections and diarrheal diseases (Mara & Cairncross 1989; Cifuentes *et al.* 2000; Feenstra *et al.* 2000; Blumenthal *et al.* 2001). Other health problems that are often mentioned by wastewater farmers are respiratory diseases and skin and eye problems. However information about these problems is largely anecdotal and few studies have been conducted on the possible link between these diseases and wastewater use.

This study was done to assess the risk of skin disease among farmers exposed to wastewater-fed rice cultivation in Nam Dinh city, Vietnam by evaluating whether there is a difference in incidence between people occupationally exposed to wastewater and those who are not exposed.

Methods

To capture skin conditions of long as well as short duration, a prospective follow-up (cohort) study was done. The study population was enumerated from a previous helminth and skin cross-sectional survey (Trang *et al.* 2005; Trang *et al.* in press). It included all individual aged ≥ 15 years from 202 households in My Tan commune where wastewater was used for irrigation and 201 households in My Trung commune that used river water. These people were followed over a one-year period from August 2004 to July 2005 to assess the occurrence of skin diseases. Every month, health workers visited the households and obtained information on the status of their skin conditions and relevant exposures over the past month. Any member of the study cohort reporting to have a skin problem was physically examined by a professional dermatologist and treated free of charge.

Results

At baseline level, the study population consisted of 1,107 persons aged 15 to 94 years old from 398 households. There were 197 households and 548 persons in My Tan and 201 households and 559 persons in My Trung communes. A number of the original households and people in both communes who were included in the cross-sectional study refused to participate in the follow-up study or were not present in the communes at the beginning of the study. This resulted in a lower number of participants than in the previous study.

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A total of 1,497 self-diagnosed cases of skin diseases were reported by 358 persons from both communes during the 12 months of the follow-up. Of these, 211 people with 944 monthly case reports came from the wastewater site (My Tan commune) and 147 people with 553 monthly case reports from the non wastewater site (My Trung commune), a statistically significant difference ($p < 0.05$). Nearly 90% of the people in My Tan (474 persons) had contact with wastewater at least once in the month before the monthly visits, while there were only two persons in My Trung who reported contact with wastewater over the one year period. Figure 1 shows the proportion of people in My Tan commune with wastewater contact in the past month, which was highest in August and rather constant during the period from March to July. A fewer number of people had contact with wastewater during the months of dry season, especially from December to February. About 65% of the people in My Tan and 38% in My Trung commune reported to have some work, which involved exposure to water (in general) in the past month of the monthly surveys.

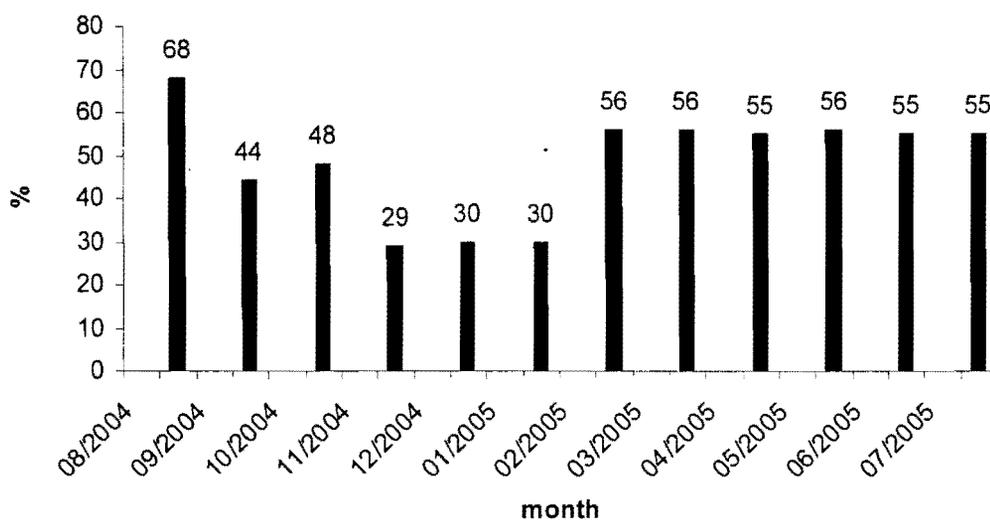


Figure 1: Proportion of people with wastewater contact in the past month in My Tan commune, August 2004 – July 2005

Figure 2 shows the monthly prevalence of skin diseases in the two communes. Throughout the one year of follow-up there was a significant difference between My Tan and My Trung communes ($p < 0.05$), except in February 2005 ($p = 0.052$) and in April 2005 ($p = 0.121$). The number of reported cases of skin diseases during the rainy season (June to November) was significantly higher than in the dry season (December to May) (876 vs. 621 cases), yielding an odds ratio of 1.47 (95% confidence interval 1.31-1.63).

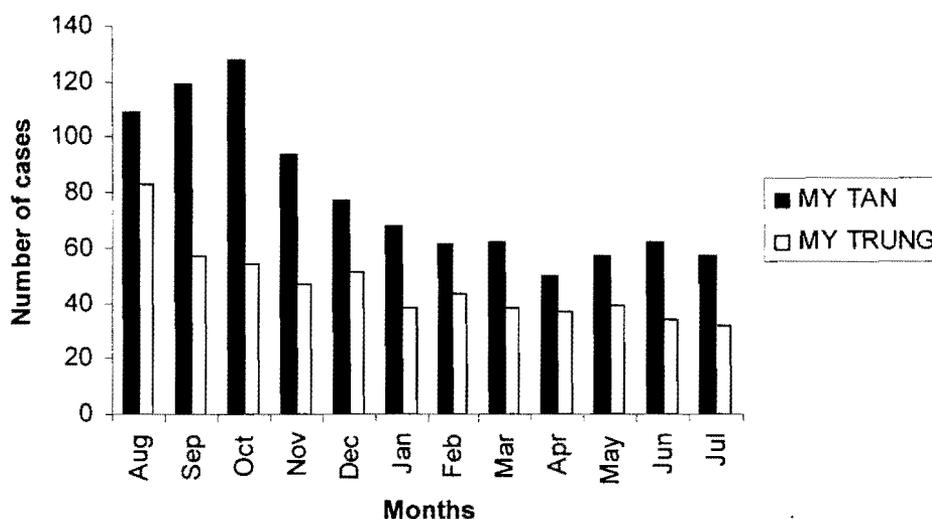


Figure 2: Monthly prevalence of reported cases of skin disease in My Tan and My Trung communes, August 2004 – July 2005

Skin diseases tended to be recurrent in many follow-up subjects and this was reflected in the number of people who turned up in the dermatological examinations. There were 284 persons coming for the physical examinations and almost 40% of these patients visited the clinic more than twice (the mean number of clinical visits by one patient was 2.8, median 2, range 1-12 visits). Thus, the number of patients registered by the dermatologists over the 12 months was 794 patients (out of 1,497 reported cases). The numbers of registered patients from My Tan and My Trung communes were 564 and 230 patients, respectively.

The age of the 794 registered patients (55.7% female) ranged from 16 to 84, with a mean age of 43.4 years. The diagnoses of these patients showed that superficial fungal infections (32.2%, of which 90.2% were from My Tan, $p < 0.05$) and atopic dermatitis (30.2%, of which 62.1% were from My Tan, $p < 0.05$) were the most common skin diseases, followed by onychomycosis (13.6%), bacterial infections (10.5%) and contact dermatitis (8.1%). Other skin conditions such as urticaria, parasitic infections and itching with unknown causes were less common. The skin diseases mostly occurred on the extremities, particularly on hands and feet (especially those with fungal infection and onychomycosis). The people with atopic dermatitis often had their skin conditions localized on the trunks or the entire body.

Discussion

The significantly higher incidence and monthly prevalence of skin disease in the wastewater use site (My Tan commune) suggests that exposure to wastewater is an important risk factor for skin diseases. The localization of the skin diseases which mostly concentrated on the hands and feet of the patients also supports this relationship between skin disease and exposure to wastewater. In doing agricultural tasks such as cultivation of rice or vegetables, the hands and feet of the farmers were often the most intense and frequently exposed parts of the body to the wastewater. Consequently they are very likely to get irritated by chemical and pathogenic agents in the wastewater.

The seasonal variation of skin disease, especially the significantly higher risk of skin disease in the rainy season, suggests that “wet work” may have some role on the occurrence of skin disease. The

term “wet work” refers to occupations which require exposure to water and the agents contained in water for a large part of the day. Water itself has been considered an external irritant to the skin (Tsai & Maibach 1999), and the skin ailments characterized by prolonged exposure to water include signs such as scaling, redness, vesicles, pustules, and erosion (Alberti *et al.* 1999). These signs are often associated with skin diseases such as fungal infections. These were the most common skin conditions diagnosed in the registered patients, and a majority of them came from the wastewater site.

The present preliminary results can therefore not demonstrate conclusively whether it is the water itself or the wastewater that poses the risk for skin diseases. This association needs to be ascertained when other exposure variables and potential confounding variables are included in the analysis. These variables include gender, occupation, history of previous skin problems, occupational involvement with wastewater and the use of personal protective measures, which were collected at the first monthly survey and the hygienic behaviors after work which were recorded at every monthly visit.

This study is one of the very few epidemiological studies that have dealt with skin disease as an outcome of the exposure to wastewater used for irrigation in agriculture and aquaculture. Our finding of the risk of having skin disease among people living in a wastewater-fed area was in line with some of the studies that also looked at skin diseases among wastewater farmers (Feenstra *et al.* 2000; Devaux *et al.* 2001). However, in these studies, skin disease was not assessed as a major health consequence of the use of wastewater, but only considered one in a range of possible health problems associated with wastewater exposure. Other studies addressed the skin disease among industrial workers rather than agricultural workers, particularly in sewage treatment workers (Srivastava & Pandey 1986; Scarlett-Kranz *et al.* 1987; Thorn & Kerekes 2001). It is however noteworthy that there have been ongoing studies done by other projects also looking at the associations between skin disease and wastewater use, such as the ENRECA project in Hanoi (Danida funded) and the PAPUSSA project in Hanoi and Phnompenh (EU funded). It is hoped that when finished, these studies will together provide a rather complete picture of skin problems among wastewater users. In addition, such studies could also contribute to the growing body of literature in justifying the relationship between the use of wastewater in agriculture and the health of the people who are using it.

Conclusion and Perspectives

In conclusion, this study suggests that rice cultivation with wastewater poses a risk for skin disease. This relationship will have to be tested when the full data set with other variables is analyzed.

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