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รายงานผู้ป่วย

A Case Report

Experience of an Epidemic Outbreak Control of Scabies Among Prisoners in Nakornpathom Province. Do Amphetamine Prisoners Affect as a Reservoir of Scabies in Thai?

ประสบการณ์การควบคุมการระบาดของโรคหิดในผู้ต้องขังในจังหวัดนครปฐม ผู้ต้องขังคดียาบ้าเป็นแหล่งของเชื้อหิดที่มีผลกระทบต่อคนไทยหรือไม่

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ABSTRACT

A study of epidemic outbreak control of 424 scabies prisoners from 6 prisons in police stations at Nakornpathom province during November -December 2000. The data were analyzed and five treatment regimens were studied. As being expected, there was an ideal condition for scabies outbreak in the prisons e.g. overcrowding, poor personal hygiene, and malnourishment. Most prisoners were found guilty of amphetamine consumers/sellers (83.3/16.7%). They played an important role in spreading scabies through Thai community. Prevalence of scabies in Thai community may be predicted by amphetamine problem in Thailand. It was found that only the number of lesions in non-crowded prisons and frequency of taking a bath (daily vs. not daily) in crowded prisons showed significant correlation to response of treatment. This study verified the beneficial effect of all given treatment regimens. We concluded that 25% benzyl benzoate lotion applied for 3 consecutive days is a reasonable economic approach for mass treatment if the application of scabicide is under strict supervision protocol. A clear national policy and implementation is necessary for prevention of the transmission of scabies between prison and community. Finally, we have suggested several means to combat scabies outbreak in prisons and proposed an instruction for

treatment scabies among prisoners.

Key words : Scabies outbreak, prisoner, amphetamine users.

บทคัดย่อ

การศึกษาการควบคุมการระบาดของโรคหิดในผู้ต้องขังจำนวน 424 ราย ซึ่งถูกจำขังในห้องขังของสถานีตำรวจภูธร 6 แห่งในจังหวัดนครปฐม ระหว่างเดือน พ.ย.-ธ.ค. 2543 ผลการวิเคราะห์ข้อมูลและการรักษาพบว่าสภาพสิ่งแวดล้อมในสถานกักขังมีความเหมาะสมอย่างยิ่งที่จะทำให้เกิดการระบาดของหิด เช่น มีความเป็นอยู่ที่แออัด สุขอนามัยส่วนบุคคลไม่ดี ผู้ต้องขังมีภาวะโภชนาการต่ำกว่าเกณฑ์เฉลี่ย นอกจากนี้พบว่าผู้ต้องขังส่วนใหญ่มีความผิดคดียาบ้าทั้งเสพและค้าร้อยละ 83.3 และ 16.7 ตามลำดับ ซึ่งผู้ต้องขังเหล่านี้มีบทบาทอย่างมากในการแพร่กระจายเชื้อหิดสู่สังคมไทยภายนอก ความชุกของการติดเชื้อหิดในคนไทยอาจทำนายได้โดยขนาดของปัญหายาบ้าที่มีอยู่ พบปัจจัยเพียง 2 ปัจจัยที่สัมพันธ์กับผลการรักษา ได้แก่ ในสถานกักขังที่ไม่แออัด ปัจจัยคือจำนวนของผื่นและในสถานกักขังที่แออัด ปัจจัยคือความถี่ของการอาบน้ำด้วยสบู่ ที่มีความสัมพันธ์กับผลของการรักษาอย่างมีนัยสำคัญทางสถิติ พบว่ายาทุกสูตรที่ใช้ในการรักษาผู้ป่วยครั้งนี้สามารถรักษาผู้ต้องขังที่ติดเชื้อหิดได้ผล แต่การใช้ 25% เบนซิล เบนโซเอท ทาทั้งตัวติดต่อกัน 3 วันน่าจะเหมาะสมทางเศรษฐกิจในการรักษาหิดในผู้ป่วยจำนวนมาก ถ้าระหว่างการรักษามีการปฏิบัติตามคู่มือซึ่งบอกขั้นตอนการรักษาอย่างเคร่งครัด การกำหนดนโยบายระดับประเทศเพื่อคุมการระบาดของหิดในสถานกักขังและป้องกันการระบาดออกสู่ชุมชนเป็นสิ่งที่จำเป็นอย่างยิ่งในการควบคุมหิด ท้ายที่สุดผู้วิจัยได้เสนอขั้นตอนการทายาและมาตรการในการควบคุมซึ่งเหมาะสมสำหรับผู้ต้องขังที่เป็นหิด

คำสำคัญ : การระบาดของเชื้อหิด ผู้ต้องขัง ยาบ้า

Introduction

The resurgence of scabies is continuing unabated, and more new patients have been identified. As already mentioned in literature, an epidemic of human scabies occurs in crowded groups of people such as in ritual activity, camping, hospital, residential cares, defense force and prison etc.[1-9] Sporadic cases have been found in community. During the last 9 years (1992-2000), the prevalence of scabies patients at Institute of Dermatology (IOD), BKK, Thailand* had been increasing continuously from 197 cases to 882 cases and so had the cases of amphetamine addicts among Thai who went seeking scabies treatment.[10,11] Recently, Thailand has faced a big problem of amphetamine consuming. During 1997-2000, the number of drug addicted cases increased. At the year 2000, 40.7% of all convicts (67,155/164,986 cases) finished sentence and found guilty of drug addiction[11] and among them 33.3% pled guilty to the charge of amphetamine.[11] The above information implies that amphetamine problem has been threatening Thai health in which skin problem is one caused by it. During 1997-2000, about fifty percent of scabies patients at Institute of Dermatology have history of imprisonment or contact with a prisoner who just released

from jail.[10]

Human scabies is caused by *Sarcoptes scabiei var hominis*. It is an obligate parasite of humans and will exist for only two or three days when away from human skin.[12,13] Scabies is a highly contagious, spreading mainly by close personal contact. It manifests clinically by an exquisitely intense pruritus cutaneous which is very suggestible, and the marked nocturnal itchy is highly distinctive in the scabietic patients. There also appears to be an increase in the less known, less typical forms of scabies such as scabies with syphilis, nodular and bullous scabies, Norwegian (crusted) scabies and scabies incognito.[13-19] A seasonal pattern of morbidity was evident,[6,20] maximum incidence occurred during winter months. The average number of scabies patients at IOD also related to seasonal variation.[10] The reason for the seasonal variation is not clear. Several possibilities may be suggested. There may be fewer changes of clothing and less personal hygiene in the winter months and this would favor the spread of mites. There are many promoting factors of scabies infestation such as overcrowding, poor personal hygiene, and immunocompromised host.[6,11] Scabies is one of the dermatological diseases showed comorbidity with psychiatric disorders, mainly anxiety neurosis and neurotic depression.

We have an opportunity to examine prisoners in Nakornpathom province from November-December 2000 on the special occasion of commemoration for the King's birthday under the prisoner health promotion program and the data are analyzed. Statistical significant level that was less than or equaled to 0.05 was considered for analysis.

Material and methods.

The prisoner health promotion program was jointly conducted between the Provincial Health Head Office and the Provincial Police Head Office. All prisoners in six police station prisons in Nakornpathom province at that time were interviewed and examined by two well-trained dermatologists. Then data (as shown in Table 1,2) were recorded on an assigned case report form. These included demographic data and promoting factors of infestation. General health was evaluated as BMI [body weight in kg/height in $m.^2$]. The cases were diagnosed by mite isolation or by clinical diagnosis. The laboratory examination was randomly requested and done by two experienced technicians. The specimens were obtained by shaving the apex of a papule with a razor blade and then performing a routine potassium hydroxide preparation; best yields were from the most recent papules or most freshly excoriated papules. The next scraping was done if skin lesion suggested a resistance or re-infestation. Each prisoner's fomites were vigorously shaken in a big plastic bag in order to collect debris that was looked for scabies under a light microscope. After physical examination was complete, various regimens as shown in Table 2 were randomly given to prisoner. The medicine was applied and left on the skin for 24 hours then washed off thoroughly on the bath. It was applied with a light, even film to the entire body below the ears down, and rubbed in thoroughly but avoided eyes and mouth area. The first treatments were under supervision of experienced staff of IOD, whereas the others treatment were done by staffs of Nakornpathom Provincial Health Head

Office. The usual method of washing particles of clothing in contact with the skin was recommended. The cases were scheduled for follow-up by a week interval after treatment for two times. They were examined clinically and any persistent signs of scabies: pruritus, nodules, excoriations or eczematous reactions were noted. Clinical evaluation after treatments was made by the same dermatologists. A second treatment would be given a week later if the cases who were treated with regimen 1, 3, 4, 5 still had symptoms and skin lesions. They were defined as treatment failure. At day 14 - a cut point of time, all treatment regimens were evaluated. Patients were assessed as cured if all original lesions were healed and as improved if healing lesions persisted but no new lesions had appeared. These cases were defined as a good responder. They were judged not cured if there was no improvement of pruritus and there were new lesions characteristic of active infestation. To establish drug resistance, certain criteria must be fulfilled. First, a definite diagnosis must be made, skin scraping contained intact mites eggs or scybala. Second, it must be ascertained that the drug was administered properly. Third, verification of drug resistance depends on the persistence of disease after treatment. Finally, the possibility of re-infestation must be excluded. The term re-infestation was applied to the patients who were completely clear at 2 weeks and developed new lesions with positive microscopic findings at 1 month after the diagnosis was made. These patients were not counted in this study. Specific signs and symptoms were recorded at each evaluation were erythema, edema, rashes, pruritus, burning, stinging, tingling, and pain. The patients were told that itching might persist for several days after treatment and therapy was not to be repeated unless they were told by authorized dermatologists to do so. All staffs of police stations were treated at the time. Generalized surveyed of prisons were also done by sanitation officers at first visit. After floor and clothes dust and prisoner's skin scales were collected, the cells were mopped with 10% aqueous permethrin.

Results

After a survey of six prisons, the studied sites could be categorized according to the environmental condition and density of prisoners per a square meter into two groups; a crowded prison had an average density of more than 3 prisoners/m.^{2} Most prisoners had limited space to move. A non-crowded prison had less than one prisoner/m.^{2} All prisons were composed of one building, cells and staff's offices were included in the same building. An arrested zone is a square room with thick wall and divided into small cells by thick balustrades. Female prisoners are separated from males. A toilet corner is inside a cell in which only a WC pan and a pipe are available. Drinking water is obtained from a pipe or a bottle of water given by their relatives. Some cells were divided horizontally by pieces of wood making low two-storeys room in order to increase living area. In general, the processes of arresting were recorded as the followings: all new prisoners are registered then males and females are separated into cells. They had a little chance to go outside a cell. The government supports two

meals; breakfast and dinner and the third meals were given from their relatives. Usually, prisoners in the same cell shared their food. Prisons at provincial level were overcrowded and there was no place for convicts to lie down. Prisoner slept by sitting position or by lying and stretching out their legs over their roommates' bodyparts. In female cell, there was enough space to sleep, but they had to sleep skin to skin contact. Opportunities for transmission were abundant. The prisoners who were under an arrest at sub-provincial level (non-crowded) had a better life. They took a bath every day in contrast to those in crowded prisons who cleaned their bodies by wiping with a piece of wet cloth. In addition, temperature at the studied sites ranged from 25°C to 35.5°C. Crowded cells had an average temperature of 30 °C and non-crowded cells had an average temperature of 27°C. When came close to the cells, we felt warm air and smelt pungent human odor.

A total of 424 prisoners, 357 men and 67 women from 6 prisons were included in this program. All 62 cases that were requested for skin scraping had positive scabies. Many prisoners had been arrested for years but some recently came in. Demographic information and basic background of them were shown in Table 1.

Factors that might affect treatment have been recorded (Table 2). Briefly, most prisoners were low educated, malnourished, poor personal hygiene, found guilty of amphetamine addiction (83.8%) and most of them had a history of drug use before imprisoned (68.2%). They had their own favorite corner but most of them had a limitation in movement. It is not possible to be absolutely certain of a source of the outbreak because there has been scabies infestation for long time and no one knows when it began. There was quite a big number of prisoner came in and were released every day. Most cases moved directly from houses to prisons (88.7%) and a few cases (11.1%) moved from one prison to the others, 71.3% were imprisoned for the first time, 21.4% - a few times, 6.5 % more than 4 times and a few cases of them were imprisoned for 10 times. At second visit, 73.9% completed follow-up and 75% of them showed good response to treatment.

The results are presented in Table 3. As a result, there were immigrants, who were being transferred to immigrant department within 1-2 days after an arrest, and some of them were released upon posting bond, seventy-five cases (17.6 %) lost follow-up. About 93.7% of cases showed improvement within 4 days. According to Thai law, an amphetamine consumer could be released upon posting bond within a week. Transferring of convicts is also one of Thai Justice steps during case trial. The whole process promoted effectively a transmission of scabies from places to places. Surprisingly, based on this study 5 cases who were imprisoned for years in non-crowded cells but had no symptom or skin lesions. This may prove that there are actual cases who have immunity to scabies then come a question concerning that whether they are a healthy carrier. There were 2 cases had paralysis and had prominent lesions and numerous mites on a paralyzed part of body. We proposed that itchiness is useful because it stimulates a host to get rid the mites by scratching.

The cases were divided into two groups

Table 1. Number and percentages of demographic information of studied cases

Demographic information of the studied cases	Number of cases	Percentage
Male : female	357 : 67	84 : 15.8
Education : illiterate	78	18.4
Primary and secondary school	253	59.5
High school	79	18.6
Technical colleges and university	14	3.3
Marital status : single	241	56.7
Married	158	37.2
Separated	23	5.4
Sexual deviation : heterosexual	412	96.9
Homosexual	2	0.5
Frequency of imprison (times) : 1	303	71.2
: more than 1	119	27.8
Causes of conviction : Amphetamine and its compounds	354	83.3
: Immigrants	60	14.1
: Others	9	2

Missing data are not shown in this table.

according to the density of prisoner per a square meter. The variables were analyzed to determine the relation of them to response of treatment, only the number of lesions and personal hygiene during imprisonment are significantly different between the crowded and non-crowded group. Concerning on the density of prisoner on response of treatment, in crowded place the number of lesion did not correlate to the response of treatment (p-value = 0.867) but in non-crowded place showed significantly correlation (p-value = 0.000) (Table 4). Concerning on frequency of taking a bath, in crowded prison, cases who took a bath everyday showed significant better response to treatment than a non-crowded group (p-value = 0.031 Vs. 0.500) (Table 5). Moreover, none of jail personnel had symptoms. The floor dust and prisoner's clothes debris were examined under light microscope and *Chorioptes bovis* was identified but not the *Sarcoptes scabiei var hominis.*

Discussion

Several interesting features were brought to light by an experience with these 6 prisons. Concerning on general survey, although a number of infested male prisoners were bigger than female as were found in general population, the reason of

Table 2. Shows the number and percentage of factors that might influence course of scabies and response of treatments in prisoners.

Detail	Number of cases	Percentage
BMI level : 1 (more than 25%)	28	6.6
: 2 (20-25%)	217	51.1
: 3 (less than 20%)	172	40.5
History of contact with scabies cases : no	397	93.4
: yes	26	6.1
History of HIV positive : no	416	97.9
: yes	4	0.7
History of jaundice : no	397	93.4
: yes	25	5.9
History of kidney disease : no	412	96.9
: yes	9	2.1
History of tuberculosis : no	415	97.6
: yes	8	1.9
History of drug addicts : no	132	31.1
: yes	290	68.2
History of anxiety : no	315	74.1
: yes	106	24.9
History of scabies infestation : no	382	89.9
: yes	40	9.4
History of nocturnal itchy before imprisonment : no	338	79.7
: yes	85	20
Severity of involvement at the time of examination : no lesion	146	34.4
: mild (less than 50 lesions)	140	32.9
: moderate (50-200 lesions)	72	16.9
: severe (more than 200 lesions)	64	15.1
Frequency of taking a bath with soap per day : 1 /day	113	26.6
: 1 / week	141	33.2
: never	133	31.3
Frequency of changing clothes : Never	27	6.4
: Once more than a week	84	19.8
: Once a day	307	72.2
Quality of cleaning of bed sheet/blanket/clothes : Never	57	13.4
: With hands and detergent	353	83.3
: Other means	6	1.4
Quality of food : level 1 : Good (three meals, enough amount)	117	27.5
: level 2 : Moderate (three meals, not enough amount)	177	41.6
: level 3 : Bad (less than three meals, not enough amount)	119	28.0
complete follow up (at the 2nd week) : Yes	314	73.9
: No	75	17.6

Table 2. (ต่อ)

Detail	Number of cases	Percentage
Treatment regimens		
1. Application of 25% benzyl benzoate emulsion all over the whole bodies for 7 days.	98	23.1
2. Application of 25% benzyl benzoate emulsion all over the whole bodies for 3 days. Then wash off and reapplication the other courses after that 1 week.	106	24.9
3. Application of 25% benzyl benzoate emulsion all over the whole bodies for 3 days.	29	6.8
4. Application of 25% benzyl benzoate emulsion all over the whole bodies for 1 day.	75	17.6
5. Application of 1% gamma benzene hexachloride all over the whole bodies for 1 day.	109	25.6
Response of treatment (2 week evaluation) : good result	308	72.5
: resistance	100	23.6
Duration of improvement after application of medicine (days)		
No skin lesion at the beginning	146	34.93
1-2 days	124	29.67
3-4 days	121	28.90
5-6 days	22	5.30
7-9 days	5	1.20

Missing data are not shown in this table.

Table 3. Show variables in crowded and non-crowded prisons related to response of treatment regimens.

Variables	Cured	Not cured
Crowded prison (density is more than 3 prisoners / m^2)	191 (79%)	57 (21%)
Non-crowded prison (density is 3 or less than 3 prisoners / m^2)	116 (73%)	41 (27%)
Total	307 (75%)	98 (25%)
Treatment regimen 1 :		
Crowded prison	63 (64.3%)	35 (35.7%)
Non-crowded prison	0 (0%)	0 (0%)
Treatment regimen 2 :		
Crowded prison	36 (100%)	0 (0 %)
Non-crowded prison	62 (88.6%)	8 (11.4%)
Treatment regimen 3 :		
Crowded prison	0 (0%)	0 (0%)
Non-crowded prison	6 (50%)	6 (50%)

Table 3. (ต่อ)

Variables	Cured	Not cured
Treatment regimen 4 :		
Crowded prison	0 (0 %)	0 (0 %)
Non-crowded prison	47 (63.5%)	27 (36.5%)
Treatment regimen 5 :		
Crowded prison	87 (79.8%)	22 (20.2%)
Non-crowded prison	0 (0 %)	0 (0%)
Total	301 (75.4%)	98 (24.6%)
Degree of involvement ; mild : crowded prison	93 (78.2%)	26 (21.8%)
Non-crowded prison	109 (73.2%)	40 (26.8%)
Degree of involvement ; moderate : crowded prison	50 (75.8%)	16 (24.2%)
Non-crowded prison	5 (83.3%)	1 (16.7%)
Degree of involvement ; severe : crowded prison	47 (75.8%)	15 (24.2%)
Non-crowded prison	2 (100%)	0 (0%)
Total	306 (75.7%)	98 (24.3%)
BMI grading : 1 (27 cases)	17 (63%)	10 (37%)
: 2 (209 cases)	163 (78%)	46 (22%)
: 3 (163 cases)	121 (74.2%)	42 (25.8%)
Total	301 (75.4%)	98 (24.6%)
Quality of food : level 1 : Good (109 cases)	76 (69.7%)	33 (30.3%)
: level 2 : Moderate (181 cases)	146 (80.7%)	35 (19.3%)
: level 3 : Bad (114 cases)	84 (73.7%)	30 (26.3%)
Total (404 cases)	306 (75.7%)	98 (24.3%)
Personal hygiene ; changing of clothes : once a day	6 (00%)	0 (0%)
Personal hygiene ; changing of clothes : once more than a week	7 (77.8%)	2 (22.2%)
Personal hygiene ; changing of clothes : never	286 (74.9%)	96 (25.1%)
Total	299 (75.3%)	98 (24.7%)
Personal hygiene ; cleaning of clothes/blanket : never	10 (83.3%)	2 (16.7%)
Personal hygiene ; cleaning of clothes/blanket : with hands and detergent	262 (76.6%)	80 (23.4%)
Personal hygiene ; cleaning of clothes/blanket : other means	27 (62.8%)	16 (37.2%)
Total	299 (75.3%)	98 (24.7%)
Personal hygiene ; frequency of taking a bath with soap : once a day	73 (67.6%)	35 (32.4%)
Personal hygiene ; frequency of taking a bath with soap : 1/ week	107 (81.1%)	25 (18.9%)
Personal hygiene ; frequency of taking a bath with soap : never	98 (76%)	31 (24%)
Total	278 (75.3%)	91 (24.7%)

Missing data are not shown in this table.

Table 4. Shows the correlation of prisons, response to treatments, number of lesions.

Prison	Response to treatments	Number and % within response to treatment	Lesion found					Pearson chi-square		
			No	< 50	50-200	< 200	Total	Value	df	Asymp. Sig. (2-sided)
Crowded	Cure	Count	47	46	50	47	190	.725	3	.867
		%	24.7	24.2	26.3	24.7	100			
	Resist	Count	11	15	16	15	57			
		%	19.3	26.3	28.1	26.3	100			
	Total	Count	58	61	66	62	247			
		%	23.5	24.7	26.7	25.1	100			
Non - Crowded	Cure	Count	72	37	5	2	116	35.233	3	.000
		%	62.1	31.9	4.3	1.7	100			
	Resist	Count	5	35	1	0	41			
		%	12.2	85.4	2.4	0	100			
	Total	Count	77	72	6	2	157			
		%	49.0	45.9	3.8	1.3	100			

Table 5. Shows the correlation of prisons, daily bathing and response of treatment.

Prison	Frequency of taking a bath	Number of cases and % within bathing	response to treatments		Total	Continuity correction		
			Cure	Resist		Value	df	Asymp. Sig. (2-sided)
Crowded	Daily	count	55	26	81	4.665	1	.031
		%	67.9	32.1	100			
	Not daily	count	108	24	132			
		%	81.8	18.2	100			
	Total	count	163	50	213			
		%	76.5	23.5	100			
Non - crowded	Daily	count	18	9	27	.456	1	.500
		%	66.7	33.3	100			
	Not daily	count	97	32	129			
		%	75.2	24.8	100			
	Total	count	115	41	156			
		%	73.7	26.3	100			

high-infestation rate among male prisoners was different. Since male convicts were outnumbered females and their living condition was worse than female's. Based on this study a person who was involved in amphetamine drug was a primary potential carrier of scabies. The spreading of human scabies and fluctuations in its incidence may refer to the size of amphetamine addiction in Thailand. Even though there were a few cases of enrolled immigrants, the capability to transfer scabies is no less in magnitude so that a written policy dealing with the management of them is worth concerning. Prisoners including immigrants who were released within a few days contributed much to spread scabies through community because they were infected and went out with no symptoms. Besides, other infectious diseases have been reported in scabies; HIV positive, jaundice and tuberculosis were also recognized in studied cases. Most cases showed good response to given regimens. If we considered solely on percentage of treatment result in crowded prison, 25% BB applied for 3 days and reapplied the other course 1 week later and 1% gamma benzene hexachloride applied for 1 day gave a better result than 25% BB applied for 7 days. In non-crowded prison, 25% BB applied for 3 days and reapplied the other course 1 week later was better than 25% BB applied for 3 days and 25% BB applied for 1 day. Briefly, 25% BB lotion given 3 consecutive days and repeated one another course one week later gave the highest percentage of good result. Anyway, 25% BB lotion given for 3 days is also acceptable and economically feasible in prisons if the application of treatment is under strict supervision protocol. This study verified the beneficial effect of all five scabies treatments. This means conventional scabicides are as effective in prisoners as in general population and the percentage of response are similar.[13,21-23] We have found that it primarily depended on how to carefully applied medicine and how experienced staff supervised them in order to insure full compliance with correct technique then the studied preparations can be used with success by prisoners. Faulty application may account for treatment failure. Actually, the choices of drugs, are obviously influenced by local traditions, its efficacy as a scabicide, and depend on any potential toxicity. Highly effective and non-toxic scabicides are therefore preferable. There were many kinds of treatments had been tried in scabies outbreaks including 25% BB lotion, gamma benzene hexachloride, 5% permethrin cream, DDT, ivermectin, disulfiram, 10% suspension of thiabendazole, and their combination regimens etc.[1-7,13,15,18,21-35] 5% permethrin cream is the most effective and most efficient approach to the problem of epidemic scabies but it is expensive and not available in. Thailand. Crotamiton appeared to have low scabicidal activity so that it is not recommended for prisoner.[36] Nails may serve as a continuing reservoir of scabies and must be effectively treated. Subungual scabies should be treated with 40% urea cream.[12] Most of scabicides were effective; nevertheless, there was high recurrent outbreak among prisoners regardless of treatment regimens. Thus, the additional means to control scabies in prison is needed. Owing to the reluctant of the administration to assume the cost of treatment of prisoner is also another problems. Institu-

tional liability is a real possibility that should be emphasized. 25% BB lotion is as effective as gamma benzene hexachloride but it is cheaper, can be made in infirmary or purchased in bulk at low cost. It may be a reasonable economic approach for the mass treatment.

The key to controlling the epidemic should be achieved by a combination of the following. First, Ministry of the Interior must handle it seriously and have a clear policy in order to control the infestation and to cut off its spread to community. The development of a specific protocol for the management of such outbreaks by the appropriate public health agencies would be useful. Furthermore, the staff should be aware of the course of scabies. They may also act as vectors in the spread of the infestation without clinical symptoms. If they are not appreciate the fact that a person can be infested without signs and symptoms during the incubation period, the vicious link between prison and community is not broken down. Better communication between the consultants, attending staffs and jail persons might have prevented this problem and its subsequent fallout. The appropriate instruction and close supervision must be followed. No exceptions should be made, and all precautions must be taken. Second, to treat all patients and their families who were in close contact. Early diagnosis and treatment is very important, and as in so many other situations the only way the diagnosis will be made is if the clinician is aware of this entity and maintains a high index of suspicion. Once the diagnosis is established, then an aggressive approach for treating all contacts of the patient may be necessary to obviate recurrent outbreaks. Third, to improve a living condition is an essential part of management. Since the socioeconomic and hygienic standards did appreciably influence the prevalence of scabies infestation. So the overall prevalence should decrease with improving hygienic and socioeconomic factors. This study shows that personal hygiene was more important in response to treatment than other factors particularly in overcrowding condition. Therefore, oovercrowding may be fundamental factor in maintenance infestation during conviction. This is the most difficult problem to be solved because the prison is overcrowded all the time. There are two modes of transmission of scabies that have been reported - 1) transmission of the mite by fomites or 2) by personal contact. Bedding can transmit scabies, but the risk was exceedingly small- an incidence that was less than 0.05%.[4,34] The more the mite on the patient, the more contagious he became. The fomites disinfection, when treating patients does not reduce the incidence of relapse or re-infestation. Therefore, fomites transmission is not a factor in the production of epidemic scabies.[34] Prolonged intimate personal contact is, undoubtedly, the most important mode of transmission. It may take up to two months develop symptoms that makes it difficult to trace contacts. Although the personal cleanliness was definitely not a sole factor in acquiring the disease, it is one of four important factors in the host which affects the contagiousness of scabies; personal hygiene, scratching, immunity and the compromised host.[37] Thus, to improve personal hygiene and immunological status of prisoner is suggested, but feasibility is low. For these reasons, if the authorized organizations realize that

Table 6. Instruction for treating scabies outbreak among prisoners.

A line consists of 20-25 prisoners is under supervision of an experienced health team. A whistle is used as a signal at changing points of each step and 2-3 experts help checking the prisoner's self-application. The whole group must finish each step at the same time and wait for a signal before proceed to next steps.

First, every prisoner must trim his finger and toenails.

Second, every prisoner must undress and keep his clothes tightly in a plastic bag.

Third, every prisoner hands his medication in front and an expert team check the medicine to make sure that he gets the right medicine.

Fourth, all prisoners apply medicine down below necks thoroughly while the supervision teams walk around to check their application technique. It is recommended that they should apply medicine in harmony part by part. Afterward, the medicine is left on the body for 24 hour (and the same step is repeated for 3 days and / or one another week - depend on treatment regimens).

In order to prevent a new case from carrying scabies to prison, every new prisoner should be treated properly with any kinds of conventional scabicides and before they are released to community. Furthermore, scabicides should be used by staff after handling prisoners.

scabies infestation among prisoners is not a problem of the limited group of people. The effective interventions should be implemented in order to prevent its transmission to people in community. A few suggestions are advised here in include having a clear policy in order to control the infestation and transmission, making an early diagnosis and treating all contact cases with effective treatment and lastly, improvement of prisoner's living condition.

Summary

A study of scabies outbreak control was done among 424 prisoners in Nakornpathom province during November-December 2000. The spreading of human scabies and fluctuations in its incidence may be clue to the size of amphetamine addiction in Thailand. Immigrant also contributed to spread scabies through community. Conventional scabicides are as effective in prisoners as in general population. This study found that 25% BB lotion given for 3 days is acceptable and economically feasible in prison if the application of treatment is under strict supervision protocol. Not only is an effective treatment important for controlling the epidemic but also the other implementation. This can be achieved by a clear national policy for management of scabies outbreak that is jointly run by authorized organizations.

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