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Evaluation of pre hospital antivenom in management and outcome of Russell's viper (*Daboia russelii siamensis*) bite cases admitted to Taungdwingyi Hospital

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Evaluation of pre hospital antivenom in management and outcome of 61 Russell's viper (*Daboia russelii siamensis*) bite cases admitted to Taungdwingyi Hospital from August 1996 to October 1997 was carried out. The first dose of antivenom (1-4 ampoules) was given at rural health centers at 1.10h ± 13 min. after the bite and remaining 0-3 ampoules totaling 4 ampoules at admission 3h ± 23min. after the first dose. Majority of the cases (75%) received liquid antivenom. Venom antigen was not detected in admission post antivenom samples in 23% , moderate envenoming in 47% and severe envenoming in 30%. A venom level of 10-40ng/ml was detected at 5h in moderately envenomed cases given 1-2 ampoules of antivenom within 3h after the bite and 10-80ng/ml in severe envenomed cases within 6h after 1-5 ampoules of antivenom. Delay in venom clearance is probably related to quality and dose of liquid antivenom used. Five out of 24 moderately envenomed cases developed severe envenoming and complications. Systemic complications developed in 5 out of 9 severe envenomed cases (5 fatality) given 1-2 ampoules antivenom within 3h and second dose within 5h and in 3 out of 9 of the severe envenomed cases (3 fatality) given 3-5 ampoules antivenom. It is highlighted that a single early bolus dose of 4 ampoules of antivenom is more effective in preventing onset of systemic complications and fatality than giving the total in two divided doses. Since early administration of antivenom in the field plays an important role in management of snakebite, arrangement should be made for the availability of antivenom at rural health centers and local health workers should be trained and legislated to give intravenous antivenom according to the guidelines after assessing degree of envenoming by performing clotting test. Rapid quantitation of venom antigen by dipstick will be helpful in the field for selection and estimation of antivenom dose.

INTRODUCTION

Russell's viper (*Daboia russelii siamensis*) bite is an occupational hazard of our farmers. Most bites occur in the paddy field while at work. Because of delay in transporting victims to nearest health centers, some patients were severely envenomed by the time they seek medical treatment. Early and adequate administration of antivenom plays an important role in management of Russell's viper bite patients. Practice of giving antivenom in the villages of Taungdwingyi, Danuphyu and Yaekyi was reported [1]. Preliminary study on clinical significance of early antivenom on limited numbers of Russell's viper bite patients by our group indicated that early antivenom combined with local compression immobilization first-aid technique was found to prevent development of systemic complications [2].

Administration of 4-10 ampoules of monospecific antivenom within 4 h after Russell's viper bite did not prevent development of renal failure had been reported [3]. This study concerns with evaluation of pre hospital antivenom administered in villages in management and outcome of Russell's viper bite patients.

MATERIALS AND METHODS

While conducting snakebite research in different township hospitals [1], we came across a number of snakebite victims received pre hospital antivenom in the villages. We took the opportunity to evaluate the early intravenous antivenom in management and out come of Russell's viper bite cases. Since farmers are aware of the importance of receiving early antivenom in management of snakebite, they stock antivenom at room temperature in the villages for emergency use. Because of health education, local health workers are aware of using antivenom in management of snakebite and the role of clotting test in assessing degree of envenoming before giving antivenom. Snakebite cases given a variable dose of antivenom at the villages and then admitted to Taungdwingyi hospital during August 1996-October 1997 were studied.

On admission, routinely a total dose of 4 ampoules of antivenom was given to all snakebite cases. Twenty minute clotting test was performed on admission post antivenom samples in order to assess the clotting status and degree of envenoming. Serum was saved onto filter paper strips, air dried, sealed in a plastic bag and transported to the Venom Research Laboratory, Department of Medical Research (Lower Myanmar), Yangon for determination of venom antigen level by Enzyme immunoassay technique [4]. Clinical details of the patients were recorded in standard proforma.

Serum venom antigen levels were determined by double antibody sandwich enzyme immunoassay technique (EIA) method described by Voller *et al.* (1979) [5]. One hundred normal healthy adults from the same locality as the snakebite victims but had no recollection of snakebite were screened for venom antigen by EIA. The mean absorbance value ± 2 Standard deviations was taken as normal cut-off value. Details were described in our earlier paper [4].

RESULTS

A total of 61 snakebite cases given 1-5 ampoules of antivenom in the villages were available for the study. Majority of the victims (74%) were males of 31 years old (14-60yr) who were bitten while at work (54%) and walking home or in the field (46%). The victims received 1-5 ampoules of antivenom at 1.10h ± 13min (010-430h) after the bites and remaining 0-3 ampoules (totaling 4 ampoules) on admission 3h ±23min (045-1020h excluding one in 25h) after the first dose. Two severe envenomed cases treated with 4 ampoules antivenom received an additional 4 ampoules of it at the hospital.

Venom antigen levels after the first dose of antivenom

Determination of admission post ASV venom antigen levels of 61 snake bite patients showed no antigen was detected in 23% (n14), 16.4ng/ml (10-40ng/ml) in 47% (n29) of the patients presented with clottable blood ("local") and 47.2ng/ml (10-80ng/ml) in 30% (n18) of severe envenomed cases.

A venom level of 10-40ng/ml was detected up to 5h in "local" envenomed cases given 1-2 ampoules of antivenom within 3h after the bite (Table 1) and 10-20ng/ml in the cases given 3-4 ampoules of antivenom within 4h. Venom antigen 10-80ng/ml was detected up to 11h in severe envenomed cases (n18) given 1-5 ampoules of antivenom within 5h after the bites.

Table 1. Clinical details, antivenom timing and development of systemic complications of 61* Russell's viper bite cases

Degree of envenoming	ASV 1st dose (h)	Timing 2nd dose (h)	No: of Subjects	ASV 1st dose (amp)	ASV 1st dose (h)	ASV 2nd dose (h)	Venom level after 1st dose ASV (ng/ml)	Systemic envenoming (n)	Systemic complications	Fatality
Clotted (local)	3	5	25	1-2	052 (010-230)	2.12 (045-445)	17.4 (10-40)	5	S-1 SA-2 SAB-1	0
	4	4	4	3-4	1.21 (015-330)	2.55 (105-400)	12.5 (10-20)	1	SA-1	0
Nonclot (Systemic)	3	5	9	1-2	1.27 (030-300)	4.06 (230-440)	51.2 (10-80)	9	SA-2 SAB-2 SAR-2	5
	5	11	9	3-5	3.27h (030-430)	6.14 (210-1020)	48.8 (40-70)	9	S-2 SA-1 SAR-1	3

* No venom antigen was detected in 14 admission post antivenom cases.
ASV=antivenom, S=shock, SA=shock+albuminuria,
SAB=shock+albuminuria+haemorrhagic manifestations, SAR=shock+albuminuria+renal failure

Clotting test and antivenom therapy at the villages

Clotting test was carried out on only 19 out of 61 cases (31%) in rural health centres before giving antivenom. Eleven were "locally" envenomed and 8 were severely envenomed. Of 11 "local" envenomed cases, nine received 2 ampoules and the remaining 3 ampoules. Of eight severe envenomed cases, one ampoule was given to one, two ampoules to 3, four ampoules to 3 and five ampoules to one.

Forty-six cases (75%) received liquid, 14 (23%) lyophilised and one (2%) mixed (liquid and lyophilized) antivenoms. The antivenom was administered intravenously at rural health center (60, 98%) and at home (1, 2%).

Thirty-nine percent (24) received the first dose of antivenom within 30 minutes following the bite, 57% (35) in one hour, 87% (53) in 2 hours, 93% (57) in 3 hours, 98% (60) in 4 hours and 100% (61) in 430 hr.

Venom neutralization following liquid and lyophilized antivenom

Since venom antigen could be detected in 4 "local" and 4 severe envenomed cases following 1-4 ampoules of lyophilized antivenom, no attempt was made to compare its neutralizing efficacy with that of liquid antivenom.

Clinical details of the cases

Clinical details, antivenom timing and development of systemic complications of the cases are presented in Table 1.

"Local" envenoming cases

In 29 "local" envenoming cases treated with 1-4 ampoules of antivenom, 6 developed severe envenoming (5 with complications) during the course of treatment (Table 1). Shock developed in one, shock plus albuminuria (n3) and shock plus albuminuria plus haemorrhagic manifestations (n1) such as haematemesis, malena, haematuria and shock on day 2. All recovered from shock.

Severe envenomed cases

Of 18 severe envenomed cases, 9 received first dose of antivenom (1-2 ampoules) within 3h and second dose in 5h. From this group, 6 developed systemic complications such as shock plus albuminuria (n2), shock plus albuminuria and renal failure (n2), shock plus albuminuria plus haemorrhagic manifestations (n2) such as gingival bleeding (n2), haematemesis, malena, haematuria, epistaxis (n1) and sub-conjunctival haemorrhage (n2). Five died of shock and renal failure.

In the remaining 9 severe envenomed cases treated with 3-5 ampoules of antivenom within 5h, four developed systemic complications. Shock (n2), shock plus albuminuria (n1), shock plus albuminuria and renal failure (n1), of which 3 died of shock and renal failure.

Systemic complications developed in the latter group were milder and less in number than the former. It is noteworthy that a patient given three ampoules of antivenom 30 minutes after the bite and second dose one ampoule 240h after the first could not prevent development of systemic complications, shock, albuminuria, renal failure and death.

Clot restoration time of systemic cases treated with 4 ampoules was 16.8h (6-30h).

DISCUSSION

The study highlights the value of early antivenom in management and prevention of development of complications of Russell's viper bite cases. It is learnt that 39% of the victims received antivenom within 30 minutes after the bite and twenty minute whole blood clotting test could be carried out in the rural health centre. Four severe envenomed cases were given 1- 2 ampoules of antivenom instead of 4 ampoules and more than 4 ampoules of antivenom should have been given to severe envenomed cases with complications where only 2 cases received an additional 4 ampoules of antivenom. It is probable that the dispensers were giving antivenom as an first aid to the snakebite victims rather than rendering treatment to them. It is highlighted that these cases should be treated early with adequate dose of antivenom in order to prevent development of systemic complications.

The incidence of "local" envenoming in the present study (based on post antivenom levels) (47%) is high compared to other studies (based on pre antivenom levels) (23-26%) [3, 6]. Venom antigen of local envenoming (10-20ng/ml) cases are usually cleared in 2h after antivenom [7] whereas in the present study, a venom level of 10-40ng/ml was still detectable 5h after antivenom suggesting that degree of envenoming in these "local" envenomed cases amount to **moderate envenoming** since 5 cases from this group later developed severe envenoming and complications. It is suggested that a proportion of these moderately envenomed cases could be detected early if clotting test and rapid quantitation of venom antigen by dipstick [8] (if available) could be performed in the field on all snakebite cases in order to assess degree of envenoming and early institution of appropriate dose of antivenom.

Failure of venom clearance in systemic cases up to 11h after 4 ampoules of antivenom and poor clot restoration of antivenom treated systemic cases suggested that liquid antivenom used have poor neutralizing efficacy of procoagulant activity of the venom. Use of lyophilized preparation of antivenom or proper storage of antivenom in the absence of cold chain [9] in the villages should be practiced.

Systemic complications developed in 67% of severe envenomed cases treated with 4 ampoules of antivenom in two divided doses within 440h with 56% mortality whereas

38% of severe envenomed cases treated with a bolus dose of 4 ampoules within 4h developed complications with 25% fatality. Our observation is in agreement with hospital based study carried out in Tharawaddy [3] and Taungdwingyi [6] where 38% (8/21) and 44% (7/16) severe envenomed cases treated with a bolus dose of 4 ampoules of antivenom developed complications respectively. It is highlighted that early administration of a single bolus dose of 4 ampoules of intravenous antivenom to severe envenomed cases (within 4h after the bite) in the field will have a better chance of preventing development of systemic complications and fatality compared to those given the total in two divided doses. Moreover, if antivenom therapy is combined with local compression immobilization technique [2] it will further proved to be effective in preventing development of complications.

Since early and adequate administration of antivenom to snakebite patients plays an important role in management of snakebite, arrangement should be made for the availability of antivenom at the rural health centers and local health workers should be legislated to give intravenous antivenom in the field after giving them a full comprehensive training course on first aid management of snakebite in the field including indication for antivenom therapy and management of its untoward effects, method of assessment of degree of envenoming by performing clotting test and (if available) use of quantitation of venom antigen by dip stick [8] and storage of antivenom in the absence of cold chain in the villages [9] and promotion of wearing protective boots and gloves [10] by the farmers.

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Knowledge, perceptions and behaviour of vaccine clinic attendees on DMR hepatitis B vaccination

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A clinic-based study on knowledge and perception of vaccine clinic attendees on hepatitis B vaccination was undertaken at the Department of Medical Research vaccination clinic from June to September 1998. A total of 401 clinic attendees over 17 years of age were interviewed using pre-tested structured questionnaires by trained-interviewers. Majority of clinic attendees were found to be middle-aged. Sex distribution showed male preponderance with ratio of 3:2. Fifty seven percent of clinic attendees were graduates and 54% were government officers or business persons. The most frequent residences were found as nearest townships to the vaccination center such as Dagon and Mingalataungnyunt townships. Ninety four percent had awareness of correct schedule and course of the vaccination. One-third of them did not know correctly about the hepatitis B infection and one-fourth of them could not identify the true mode of transmission. They expressed favorable attitudes towards hepatitis B vaccination for infants and pregnant women. Sources of information revealed by clinic attendees on vaccination were media, health personnel and head of the families. Information from media was found reaching more to graduates, government officers and business persons in this study. *'Reliability of vaccine potency'* and *'Being a government service clinic'* were two main reasons for vaccination of attendees. This study indicates the problem of vaccination i.e. incompleteness of course. To increase awareness and vaccination practice of community, strategies need to be developed to establish similar vaccination centers in other areas of the country.

INTRODUCTION

Viral hepatitis type 'B' is hyper endemic in Myanmar with a 10% carrier rate and 60-70% infection rate around 1990s [1]. Since hepatitis B is highly infectious, has various modes of transmission and strongly associated with liver cirrhosis and hepatocellular carcinoma, it is one of the major public health problems [2]. Accidental transfusion or contamination with infected blood and blood products, infection from mothers to newborn babies and sexual relationships are important modes of transmission. As the natural course of the disease is serious, highly transmissible and incurable, prevention plays a major role in control of the disease in community. Persons with high risk include spouses of acutely infected persons, sexually promiscuous persons, health care workers exposed to blood, persons who require repeated transfusions and, to a lesser extent, family members of chronically infected patients. However, the HB vaccine has markedly improved the ability to protect those persons with high risks of hepatitis B infection [2]. The vaccine produces protective antibody in over 90% of healthy adults who complete the course and is even more immunogenic in children [3].

In National Health Plan (NHP) (1996-2000), it was stated that the vaccination of all

newborns with hepatitis B vaccine is one of the main strategies for the control of viral hepatitis B infection. There are three main activities by NHP in the prevention and control of viral hepatitis to meet this strategic objective. Those are;

1. Scale up production of hepatitis B vaccine
2. Feasibility study for incorporation of hepatitis B vaccine into the UCI programme
3. Health education programme on hepatitis B.

Department of Medical Research (DMR) has successfully produced plasma-derived hepatitis-B vaccine, which has passed the WHO recommended tests for quality control and safety. Vaccine production is aimed to obtain in large scale. In the near future, hepatitis B vaccination will be incorporated in Expended Programme of Immunization (EPI) [4]. In order to promote the utilization of Myanmar hepatitis B vaccination and to give the information to the community about hepatitis B infection and vaccine, it should be known about vaccination practice among people, influencing factors to get vaccination and problems and difficulties of vaccination in community. Since there was very few information about knowledge, perception and behaviour of hepatitis B and vaccination in Myanmar, this study explored baseline information about knowledge, perception and behaviour in relation with socio-demographic characteristics, aiming to suggest health authority to promote HB vaccination.

MATERIALS AND METHODS

It was a cross-sectional descriptive study. DMR, the only manufacturer of the HB vaccine in Myanmar, opened hepatitis B diagnostic and vaccination clinic charging optimum price i.e. 800 Kyats per dose. Since there were 50-100 persons per day attending the clinic, data were collected at DMR HB vaccination clinic to be able to get enough sample size. During 1998 June to September, clinic attendees who came for vaccination, aged 18 and above and agreed to participate, were selected consecutively and interviewed using pre-tested structured questionnaire by trained interviewers. The questionnaire included identification, socio-demographic background, knowledge, reasons for coming, perceptions and behaviors and regularity of vaccination.

Data of 406 participants in total were analyzed using Epi Info after checking, entering, cleaning and validation. Univariate and bivariate analysis of knowledge, perceptions and vaccination practices as outcome variables using both single point and composite score were done. The associations with background variables were tested using z and Chi-square, Kruskal Wallis and ANOVA tests.

RESULTS

1. Socio-demographic characteristics

Most (52.9%) were 26 - 40 years old. Clinic attendees of 18 - 25 years old were found 24.7% of the total. Among the clinic attendees, 60% were male and 40% were female. Twenty five percent of vaccinees came from outside of Yangon city area. The rest (75%) were Yangon residents. Among vaccinees from Yangon area, most were from *Dagon* Township and *Mingala Taungnyunt* Township, which are nearest to the clinic. The clients with higher educational standard were found to be highest among all vaccinees. About 57% were *Graduates* and 33% passed their *high school education*. Remaining was *middle to illiterate*. Regarding occupation, 32.4% of clients were *the dependants*. Thirty-five percent were *government officers (including army personnel)*. About 19% were *business persons*. Forty-five percent were *unmarried* and 52% were *married*. Among the total attendees, 38% had family income of under 5000 Kyats per month and 18% had family

income over 25000 Kyats per month. Mean family size of clinic attendees was 5 ± 2.

2. *Factors concerning the vaccination of clinic attendees*

2.1. Knowledge about Hepatitis B

Table 1 shows vaccinees' knowledge about hepatitis B and the vaccine.

Table 1. Knowledge about hepatitis B

Sr. No.	Questions	% Responses			
		Yes	No	Don't know	Total
1.	Is it a communicable disease?	91.3	3.0	5.7	100
2.	Are these its complications?				
	- chronic hepatitis?	55.4	15.0	29.7	100
	- fatty liver?	34.9	26.4	38.7	100
	- cirrhosis?	57.9	13.2	28.9	100
	- liver cancer?	65.6	8.5	25.9	100
	- liver abscess	28.9	26.2	44.9	100
3.	Are those its mode of transmission?				
	- using unsterilized needle and syringe?	95.5	2.0	2.5	100
	- by doing hand-shaking with infected person?	11.5	76.6	12.0	100
	- shared use of injection needles?	96.8	1.2	2.0	100
	- by sexual relation with infected person?	79.3	9.5	11.2	100
	- from pregnant mother to foetus?	87.5	5.5	7.0	100
4.	Do you know its risk behaviours?	78.1	21.9	0	100
5.	Are those the risk behaviours?				
	- smoking?	29.2	42.4	28.4	100
	- drinking?	41.2	30.9	27.9	100
	- using intravenous drugs?	72.8	3.5	23.7	100
	- sexual promiscuity?	69.1	5.7	25.2	100
	- frequently injection?	68.8	6.0	25.2	100
6.	Can the vaccination prevent the disease?	95.0	2.2	2.7	100
7.	Can the vaccination prevent all liver diseases?	32.2	48.1	19.7	100
8.	Is there any side effect in vaccination?	11.7	62.8	25.4	100
9.	Is HBsAg testing essential to do before vaccination?	95.8	1.7	2.5	100
10.	Correct knowledge of vaccination schedule.	94.3	4.4	1.2	100
11.	Correct knowledge about interval for booster dose (i.e. one injection at next 5 years).	52.1	10.7	37.2	100

Ninety-one percent of respondents knew that HB infection is a communicable disease. More than 95% of respondents knew correctly that using of unsterilized needles/syringes and shared use of needles were modes of transmission of hepatitis B infection. Eighty-eight percent of them knew that infection could be transmitted from pregnant mothers to foetus. About 55% of respondents knew the chronic hepatitis as a complication of hepatitis B infection, and, 58% knew that cirrhosis was a complication. Liver cancer was also expressed as the complication of hepatitis B by 65.6% of them. However, 35% of respondents misbelieved that the fatty liver was one of the complications of hepatitis B.

Regarding about risk behaviour for hepatitis B infection, 78% of respondents said that they knew about it very well. Majority of those who knew risk behaviours (72.8%, 69.1% and 68.8%) knew that using intravenous drugs, sexual promiscuity and frequent receiving of injections were the risk behaviours for hepatitis B infection. About 29% of them incorrectly knew that smoking was a risk behavior. Also, 32.2% of the clinic attendees wrongly believed that the vaccine could prevent all liver diseases. Among total clients, 94.3% could answer about the vaccination schedule correctly. Clients who knew when to return for a booster dose were 52%.

Knowledge answers were given scores according to their answers and added to the total score for each person. Correct answers were scored as two. "Don't know" answers were scored as 1 and wrong answers were scored as zero. Then the totals were calculated. It ranged from 0 to 29. Mean score was 12.6 ± 11.3. Fifty-six percent of attendees got the score more than 13 and 44% got the score less than 13. There were no differences of mean knowledge scores among different age groups, sex, family income, per capita income groups and occupational groups except education groups. Among educational groups, "high

school passed" and "graduates" are found with higher mean knowledge score (i.e. 11.1 ± 11.2 and 13.7 ± 11.4) than lower level educational groups (i.e. 7.4± 9.6) (p=0.022).

2.2. *Sources of information about hepatitis B vaccination*

Many respondents (31.2%) expressed *"mass media"* such as radio/TV etc as a source of information about HB vaccination; 19% from *health personnel*; 18% from their family leaders. Those, who said that they got awareness about HB vaccination because of illness of one of their family members due to a liver disease, were 10%. Among those who got information from mass media, 42.1% of respondents were *'government officers'*. That was found as a most frequent group among others. Among those who got information from family leaders, the most frequent respondents (i.e.32%) were *'skilled and unskilled workers'*.

"*Graduates*" was 74% of the clinic attendees who were aware about HB vaccination from mass media having 2.8 times of "*non-graduate*". About 63% of clinic attendees, who had awareness due to existence of a liver disease in one of their family members, was "*non-graduate*" having 2 times higher than that of "*graduate*".

2.3. *Attitude*

As shown in Table 2, more than 75% of vaccinees agreed that everybody including infants, babies and pregnant mothers should be vaccinated. About 80% agreed that cost was not an important factor to be considered for vaccination. And also, 80% agreed that DMR HB vaccine was the safest among various vaccines. Those, who expressed that DMR vaccine was not expensive, were 64.8% of total. Only 21.5% thought that vaccination was necessary for their job promotion.

Table 2. Attitude towards the vaccination

Sr.No	Questions	% Responses			
		Agree	Neu-tral	Don't agree	Total
1.	Infants and under one babies should be vaccinated.	76.6	20.0	17.2	100
2.	Pregnant mothers should be vaccinated.	84.6	13.0	2.4	100
3.	Cost should not be an important factor to be considered.	79.8	5.2	14.9	100
4.	DMR HB vaccine is more expensive than others.	7.2	27.9	64.8	100
5.	DMR HB vaccine is safest among HB vaccines.	79.8	18.2	1.9	100
6.	My vaccination is essential for me to get job promotion.	21.5	4.0	74.5	100
7.	Everybody should be vaccinated.	96.7	1.7	1.4	100

Attitudinal answers were scored. Positive attitude towards the vaccination were scored two and the neutral attitude was scored two. The negative attitude answers were given zero score. Then, the totals were calculated. The respondents' attitude scores ranged between 0 and 29. They were grouped into (0-15) and (>15) as negative and positive attitudes towards vaccination. Ninety-four percent of vaccinees had positive attitude and 6.2 % of vaccinees had negative attitude. Like knowledge score, significant differences of mean attitude score were not found among groups of different age, sex, occupation, income and per capita income except *education*. Attitudinal scores were found increasing according to education level.

2.4. *Decision making for the vaccination*

Almost 80% of vaccinees made decision by themselves and 20% made decision by others. Among the total vaccinees, 91.4% of Government officers, 80.3% of business persons, 68.7% of high school passed and 89.6% of graduates made self-decision for their vaccination. Knowledge and attitude were found associating to their decision-

making status (p=0.006 and 0.03 respectively). Percentages of self-decision makers were higher in both groups with higher knowledge and attitude score than those with lower knowledge and attitude score (Table 3).

Table 3. Decision making among different knowledge and attitude groups

	Decision making		Total	Chi square (P-Value)
	self	others		
Knowledge scores				
- High	192	33	225	χ^2 =7.49
- Low	131	45	176	(P=0.006)*
Attitude scores				
≤15	307	69	376	χ^2 =3.6
<15	16	9	25	(P=0.05)

2.5. Reasons for coming to DMR clinic

Reasons for coming to DMR clinic were also asked. Among the total attendees, 41.6% chose DMR clinic for the vaccination due to "*reliable potency of the DMR vaccine*". Thirty-two percent of the clients said that it was due to *"being a government service clinic"* (Table 4).

Table 4. Reasons for coming to DMR clinic (Multiple responses) (N=401)

No.	Reasons	Freq	%
1.	Cheap	58	14.5
2.	Accessible	75	18.7
3.	**Reliable potency**	167	41.6
4.	**Being a govt. service clinic**	128	31.9
5.	No alternative choice	46	11.5

About 26% of 'graduate clinic attendees' came to DMR clinic because 'it was a government service clinic compared to others (35% of the clinic attendees who passed high school level education and 54% for those who had read/write to middle school level education). Vaccinees with higher-level education (i.e. 45.9% and 42.4%) relied the vaccine potency more than those persons with lower level education (i.e. 21.6%) (P = 0.028). However, lower education group more responded that they came to DMR clinic because of being a government clinic than higher education groups (54.1% of "up to middle school passed" Vs 35.3% and 26.4% of "high school passed" and "graduated" P = 0.002) (Table 5).

Table 5. Different reasons among different education groups

Reasons	% of clients who said "Yes"			χ^2	P
	R&W to Middle n = 37	High School n = 133	Graduate n = 231		
Cheap	16.2	13.5	14.7		
Accessible	10.8	18.1	20.4	1.96	0.374
Reliable potency	21.6	45.9	42.4	7.14	0.028*
Being a govt. service clinic	54.1	35.3	26.4	12.29	0.002*
No alternative choice	5.4	9.8	13.4	2.58	0.275

There were no differences among different occupational groups and their reasons why they came to DMR vaccine clinic (Table 6).

Table 6. Different reasons among different occupation groups

Reasons	% of clients who said "Yes"				χ^2	P
	Govt. officer n=140	Busi-ness n=76	De-pendant n=130	Others n=55		
Cheap	14.4	14.5	15.4	13.0		
Accessible	20.0	22.4	19.2	9.3	4.0	0.3
Reliable potency	42.9	43.4	38.5	42.6	0.7	0.9
Being a govt. service clinic	28.6	30.3	35.4	35.2	1.8	0.6
No alternative choice	13.6	10.5	10.0	9.3	1.2	0.8

("Others" includes clerks, small shop owners, and staff of private company)

DISCUSSION

Majority (78%) of clinic attendees were found to be middle-aged (i.e. 18-40 years old). Age of 41-60 years took account for 22%. These findings indicate that the persons of productive and reproductive age groups have awareness and alert with the risks of hepatitis B, its consequences and benefits of the vaccination. Vertical transmission and sexual transmission rate will significantly reduce if high proportion of middle-aged people received the HB vaccine.

Finding showed that 57% of clinic attendees were graduates. Regarding their occupation, apart from dependants, government officers are predominant next to others. Two townships, which are near the vaccination center, were found to be the major catchment areas of the vaccinees. The presence of a vaccination center nearby may be important for people to get the vaccination. Since there were occupation and residency heterogeneity among clients, socio-economic factors, accessibility and feasibility may be related to the vaccination practice.

Among the clinic attendees, two-third of them knew about the nature of hepatitis B and its consequences correctly. Three-fourth of them also knew the mode of transmission correctly. Some (30%) expressed that smoking and drinking as risk factors for getting infection which were actually not. Regarding the sources of information, many clinic attendees got it from media or health personnel. Many vaccinees who got information from media such as TV, radio are found to be high-level educational persons and government officers. Thus, IEC programme in mass media needed to be focused for grass-root level. Health personnel should also try to give clients more precise, short and clear information which will enable to meet the information needs of less educated community.

Accessibility to vaccination center may be an important factor for their vaccination practice [5]. Most of the clinic attendees expressed that they came to DMR vaccine clinic because of availability of safe vaccine and accessibility to the clinic. Majority of clinic attendees have positive attitude towards vaccination. The findings that more than 75% had positive attitudes towards the vaccination of pregnant mothers and infants (Table 2) showed there were no major constraints in community for incorporation of HB vaccination into EPI programme. But 25% of attendees did not agree with the opinion of HB vaccination to infants. Attitudes were significantly associated with self-decision making for vaccination and intention of family vaccination. Plan for improving knowledge and changing attitude should target to low socio-economic groups.

CONCLUSION

Knowledge about the disease, awareness of vaccination practice and attitudes towards vaccination among people are important to get wider coverage of vaccination practices in the community. Health education programme on hepatitis B is one of the activities for getting wider coverage of vaccination in the country to control the spread of infection. Strengthening information and education programmes on hepatitis B needs to be conducted, targeting not only to the public, but also to the health workers. Different strategies for different socio-economic strata, such as media information for general public, periodical talks and articles for more educated and specific community should be designed for more effectiveness of the programme. Disseminating complete and thorough information through manuals and guideline booklets is essential for high-risk groups and vulnerable persons.

Vaccination centers, which are feasible and accessible to the general public, will be required to achieve higher HB vaccination

coverage. Those centers should also be extended synchronously with IEC programme, thus, people will get information about the risks of HB infection and preventive measures. At the same time, the risk persons will go to the clinics for vaccination. Based on the results, it can be assumed that clinic attendees were satisfied with the locally produced HB vaccine.

Recommendation

- There should be tried to find out the ways to reduce incompleteness of vaccination course among clients.

- Vaccination centers or clinics using DMR-HB vaccine should be established at General Hospitals, State & Divisional Hospitals, Township Hospitals and Health Departments and maternal and child health care centers.

- Health care personnel should do regular health talks and peer group counseling activities for improvement of knowledge and practice on prevention of viral hepatitis B.

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Efficacy of the new batches of monospecific Russell's viper (*Daboia russelii siamensis*) and cobra (*Naja kaouthia*) antivenoms manufactured by Myanmar Pharmaceutical Factory

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Efficacy of new batch of monospecific Russell's viper (*Daboia russelii siamensis*) and cobra (*Naja kaouthia*) antivenoms manufactured by the Myanmar Pharmaceutical Factory was tested according to WHO recommended techniques. The new batch of monospecific Russell's viper antivenom is 1.7 to 5 times less effective in neutralising defibrinogenating, haemorrhagic, necrotic, lethal and procoagulant activities and 64 times in capillary permeability increasing activity compared to the reference. The efficacy of neutralisation of the lethal activity of cobra venom by the new batch of monospecific cobra antivenom is 10 times inferior to that of the reference. Because of inferior performance of the new batch of antivenoms, clinical efficacy and the dose of the antivenom to be given to human snakebite cases need to be studied.

INTRODUCTION

The monospecific Russell's viper (*Daboia russelii siamensis*) (RV) antivenom (1 ml neutralises 2 mg of RV venom) and cobra (*Naja kaouthia*) antivenom (1 ml neutralises 1 mg of the cobra venom) (MPF pamphlets) manufactured by Myanmar Pharmaceutical Factory) (MPF) have been used throughout the country for treating specific snakebites decades ago. It also serves as reference antivenoms. Since 1997, the manufacturer changed venom-antivenom neutralisation ratio of the antivenoms in line with the antivenom manufacturers of the Southeast Asia where 1 ml of the new batch of Russell's viper antivenom will now neutralise 1 mg of Russell's viper venom and that of cobra 0.6 mg. The neutralising efficacy of the biological activities of the new batches is not known and needs to be tested before put into general use. This study concerns with *in vivo* and *in vitro* testing of neutralising efficacy of the antivenoms.

MATERIALS AND METHODS

Neutralisation of different biological properties of the Russell's viper (*D. r. siamensis*) venom of Tharawaddy such as lethality ($5LD_{50}$), coagulant (3MHD), necrotic (3MND), haemorrhagic (3MDD), defibrino-genating (5MDD), and capillary permeability increasing activities (100MCPID), by the new batch of monospecific liquid antivenom (batch no: C98011, exp. 4/2001) was tested according to the WHO recommended techniques [1]. Neutralisation of the $5LD_{50}$ i.v of the cobra (*Naja kaouthia*) venom by the new batch of monospecific liquid antivenom (batch no: A98009, exp. 1/2001) was also tested according to the WHO recommended technique [1].

Table.1. Neutralising dose to different biological properties of Russell's viper (*Daboia russelii siamensis*) venom by monospecific antivenoms

Antivenom	3 MHD 2.53 mg/ml µl	3 MND 2.39mg/ml µl	5 MDD 120 µg/ml µl	100 MCPID 14.4µg/ml µl	$5LD_{50}$ iv 233.7 µg/ml µl	10 MCD 50.25 µg/ml µl
MPF(R)	10	5	3	0.039	3	0.0625
MPF(N)	40	20	5	2.5	12	0.3125
TRC	10	20	5	0.1562	3	0.125
SII	40	40	80	15	6.25	NT

(venom neutralising doses of the TRC and SII antivenoms are included for comparison, ref:3)

MPF(R) = Reference MPF antivenom
MPF(N)= New MPF antivenom
SII= Serum Institute of India
TRC= Thai Red Cross antivenom
NT= not neutralised
LD_{50}iv= lethality
MHD= minimum heamorrhagic dose
MND= minimum necrotic dose
MCD= minimum coagulant dose
MDD= minimum defibrinogenating dose
MCPID= minimum capillary permeability increasing dose

Note: neutralisation of the lethal activity (LD_{50}) is expressed as ED_{50} dose that is the amount of antivenom required to protect 50% death of the experimental animal in 24 hr following injection of the mixture.

RESULTS

Monospecific Russell's viper antivenom

The amount of the antivenom required to neutralize different biological properties of Russell's viper venom are shown in Table 1.

The new batch of antivenom is 1.7 to 5 times less effective in neutralising defibrinogenating, haemorrhagic, necrotic, lethality and coagulant activities and 64 times in capillary permeability increasing activity compared to the reference. Moreover its neutralizing efficacy was inferior to that of the Thai Red Cross and slightly more potent than that of the Indian SII antivenom.

Monospecific cobra antivenom

The new batch of monospecific antivenom requires 200 ul to neutralise $5LD_{50}$ i.v. of the cobra venom (*Naja kaouthia*). The reference (batch no: DE 96767, exp. 7/2001) and the TRC antivenoms require 21.25 ul and 80.6 ul to neutralise $5LD_{50}$ i.v. of the cobra venom respectively [2].

DISCUSSION

Although venom-antivenom neutralizing ratio of the new batch of antivenom is reduced to half of the reference, its neutralising efficacy of the different biological activities of the venom is reduced from 1.75 to 64 times compared to the reference. In particular, 5-64 times reduction in neutralising efficacy of coagulant and capillary permeability increasing activity (MCPID) is not desirable. It is expected that more antivenom will be needed to correct the clotting and permeability defects in treating Russell's viper bite cases than before. It also raises the questions that such variation in the antivenom efficacy could be due to batch-to-batch variation of the antivenom [3] which in turn depends on the quality of immungoen used for raising this particular batch of antivenom. Widely pooled venom should be used for raising antivenom in order to overcome the deficiency [1].

Since the venom neutralising efficacy of the new viper antivenom is much inferior to

those of the reference and the Thai Red Cross antivenom, it is suggested that venom-antivenom neutralization ratio should be aimed at having at least comparable or more potent efficacy than that of the Thai antivenom. Also the neutralising efficacy of lethal activity of the new cobra antivenom is also inferior to those of the reference and the Thai Red Cross antivenoms. Monitoring of the neutralising efficacy of every batch of antivenom should be carried out as a routine.

From the above observations it could be concluded that more clinical studies of the new antivenom on snakebite patients are needed in order to confirm *in vivo* and *in vitro* findings and formulation of the new antivenom should be reviewed in order to produce a high quality antivenom for treating snakebite cases throughout the country.

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Prevalence of Coronary Heart Disease risk persons in South Dagon Township, Yangon, Myanmar

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To find out the prevalence of coronary heart disease risk persons, the community-based cross- sectional descriptive study was conducted on 40 - 60 years old, 293 men and 327 women from South Dagon Township, Yangon, Myanmar. The coronary heart disease risk factors were investigated. The prevalence of coronary heart disease risk persons was scored in accord with the coronary heart disease risk appraisal (RISKO) developed by the Michigan heart association and it was found to be 43.3% in total (46.1% in men and 40.7% in women). Hypercholesterolemia (Total cholesterol >250 mg/dl) rate (28.1%) and lack of regular exercise (71.3 %) in women showed significantly higher than those of men (14.0 % and 26.6% respectively). History of smoking and hypertension was detected with significant male preponderance (72% in men versus 29.7% in women and 16.7% in men versus 10.1% in women respectively). History of cardiovascular disease in relatives was present in 44.3% of women and 36.2% of men. Over-weight was found in 15.6% of women and 13.3% of men. This study highlighted the important role of smoking and hypertension control in men and body weight, dietary control and regular exercise in women, in order to reduce coronary heart disease risk.

INTRODUCTION

The term "risk factor" in relation to cardiovascular disease and specifically coronary heart disease was used for the first time in 1961 in a paper on the Framingham study [1]. The risk factors themselves in particular high levels of cholesterol, hypertension and smoking have been measured in prospective epidemiological studies since their discovery in late 1940s. Over the years, much has been learned about risk factors in terms of understanding and recognition of new predictors of risk. The following is the list of the most frequently implicated of risk factors that identify men, women and children at high risk for coronary heart disease - diet, elevated blood lipids, hypertension, cigarette smoking, high uric acid level, family history, obesity, Diabetes Mellitus, stress and sedentary life style [2]. However, it is difficult to determine quantitatively the importance of any single risk factor in comparison to any other because many of the factors are interrelated and the risk is being increased if several of them are present at the same time.

With the change in economy, industrialization and change in life style, the major health problems of the nations in Asian Pacific region tend to shift from the infection and malnutrition to metabolic and cardiovascular ischemic diseases. In Myanmar, according to the report of cardiovascular disease project, prevalence rates of ischemic heart disease were 42.68 in

rural area and 75.51 in urban area in 1982 [3] and 42.0 in rural area and 57.9 in urban area in 1992 [4].

These risk assignments are often valuable for screening in the overall assessment of current risk and life style behavior. Optimal screening for high risk requires methods that will detect the largest possible number of persons destined to develop in future. Risk inventories and appraisal have been developed to quantify an individual's susceptibility to Coronary Heart Disease. A popular risk inventory (RISKO), which is developed by the Michigan Heart Association, is simple and easy to conduct [5]. The present study is aimed to find out the prevalence of Coronary Heart Disease risk persons at the present situation in a township of Myanmar.

Objective

To determine the prevalence of Coronary Heart Disease risk persons in South Dagon Township, Yangon, Myanmar.

MATERIALS AND METHODS

Study design

A cross-sectional descriptive study.

Study population

Both males and females of 40 to 60 years old living in South Dagon Township were studied.

Sample size determination and sampling procedure

In South Dagon Township, 12 wards were randomly selected for the study. From each ward, 60 subjects both male and female, 40 to 60 years old were selected by simple random sampling method. A total of 620 males and females were included in this study. Those taking anti-hypertensive drugs, drugs that could affect blood cholesterol level and those who were acutely ill were not included.

Data collection methods

(1) Proper history taking was done including name, age, sex, occupation, address, number of relatives having cardiovascular diseases, smoking habit (type and numbers/day) and physical activity.
(2) Body weight was measured up to 0.1 kg on a portable Bathroom type scale with the subject clothed but shoeless.
(3) Body height was measured up to 0.1 cm by a stadiometer with the subject shoeless.
(4) Blood pressure measurement was carried out according to method described by World Health Organization [6].
(5) Serum total cholesterol level was measured by using cholesterol RTU test kit based on enzymatic method [7].
(6) Relative Risk categories were carried out according to Coronary Heart Disease Risk Appraisal (RISKO) developed by Michigan Heart Association [5].

Data analysis

Summary of measurement of various categories, scoring of each sample according to their various parameters as risk, categorization by risk scores into very high, high, moderate, average, below average and well below average were carried out. The prevalence of each risk factor was carried out for males and females respectively. The difference in prevalence of each risk factor between men and women were analyzed by Pearson Chi-square test. Significant difference was considered with a $p < 0.05$.

RESULTS

Table 1 shows the general characteristics of the subjects.

Table 1. General characteristics of the subjects

	Total	Male	Female
Number of subjects	620	293	327
Age (yr)	49.43 ± 5.85	49.95 ± 6.05	48.97 ± 5.63
Height (cm)	156.64 ± 7.84	162.34 ± 5.73	151.53 ± 5.65
Weight (kg)	54.75 ± 12.55	57.30 ± 12.25	52.46 ± 12.38
Total cholesterol (mg/dl)	216.04 ± 50.47	206.81 ± 47.16	224.32 ± 51.95
Blood Pressure (mmHg)			
-Systolic	125.28 ± 20.55	127.96 ± 21.05	122.87 ± 19.81
-Diastolic	85.73 ± 12.67	87.92 ± 13.20	83.78 ± 11.87
Occupation			
-Manual workers	154 (24.84%)	90 (30.72%)	64 (19.57%)
-Sedentary workers	238 (38.39 %)	175 (59.73%)	63 (19.27%)
-Retired persons	35 (5.65 %)	28 (9.58 %)	7 (2.14 %)
-Dependents	143 (31.13%)	--	193 (59.02%)

Figure 1 shows frequency distribution of coronary heart disease risk persons according to their relative degree of risk scored by coronary heart disease risk appraisal (RISKO). In the study population, 4.68 % was at high risk, 38.55 % was at moderate risk, 53.23 % was at average risk and 3.55 % was at risk below average. In men, 5.46% was at high risk, 40.61% was at moderate risk, 50.51% was at average risk and 3.41% was at risk below average. In women, 3.98 % was at high risk, 36.70 % was at moderate risk, 55.66 % was at average risk and 3.67 % was at risk below average.

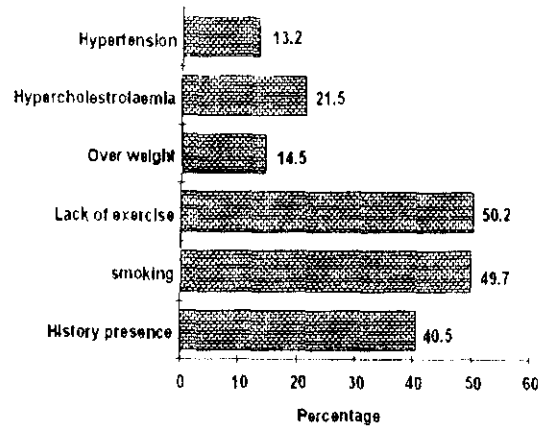

Fig. 2. The prevalence of risk factors in the study population

Figure 2 shows bar chart of the prevalence of risk factors in the study population. Of total study population, 49.8 % was found to have lack of exercise, 49.7 % was smoker, 21.5 % had hypercholesterolemia, 14.5 % was over-weight, 13.2 % had hypertension

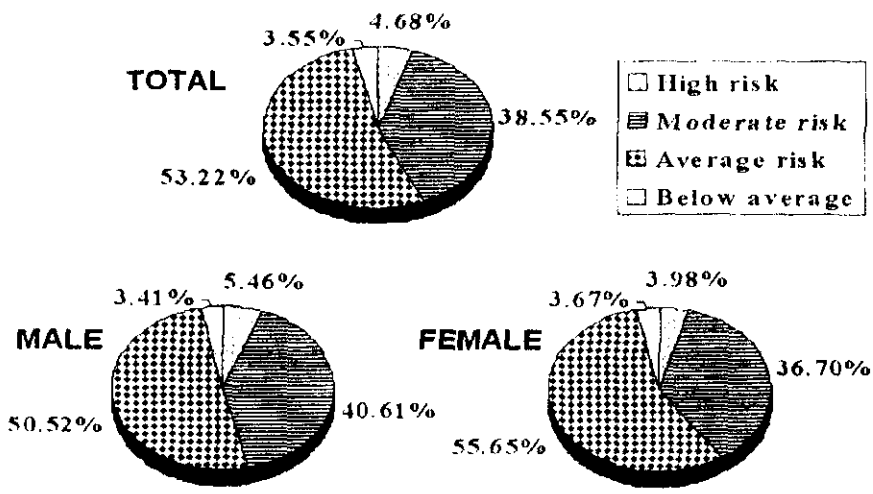

Figure 1. Frequency distribution of coronary heart disease risk persons according to their relative degree of risk scored by coronary heart disease risk appraisal (RISKO)

and 40.5 % had history of cardiovascular diseases in relatives.

Table 2 shows comparison of proportions of various coronary heart disease risk factors between male and female. Lack of regular physical activity and exercise was found in 71.3 % of women and 26.6 % of men. Seventy-two percent of men and 29.7 % of women were smokers. History of cardiovascular disease in relatives was present in 44.3 % of women and 36.2 % of men. Hypercholesterolemia was found in 28.1 % of women and 14.0 % of men and 15.6 % of women and 13.3 % of men were found to be over-weight. Hypertension was detected in 10.1% of women and 16.7 % of men.

Table 2. Comparison of the prevalence of various coronary heart disease risk factors between men and women

Risk factors	Men (% of total male)	Women (% of total female)	Difference 'p' value
Presence of history of disease in relatives	36.2 %	44.3 %	0.039
Smoking	72.0 %	29.7 %	< 0.001
Lack of exercise	26.6 %	71.3 %	< 0.001
Over weight	13.3 %	15.6 %	0.420
Hypercholesterolemia	14.0 %	28.1 %	< 0.001
Hypertension	16.7 %	10.1 %	0.015

DISCUSSION

There are many approaches in identifying prevalence of coronary heart disease in community such as WHO questionnaire, Rose chest pain questionnaire, Minnesota coded electrocardiographic criteria or ischemic chest pain. Each method has both advantages and disadvantages. However, this study was not intended to find out the prevalence of coronary heart disease. This was the study of the prevalence of coronary heart disease risk persons using a popular risk inventory (RISKO), which is simple and easy to conduct. The study detected individuals and population at elevated risk of coronary heart disease. In prevention of coronary heart disease, it is also highly desirable at maximum screening efficiency by including persons or population at risk. The prevalence of high-risk persons is 43.3 % in total, 46.1 % in males and 40.7 % in females respectively.

Many risk factors are associated with each other as well as with coronary heart disease itself. With one risk factor a forty-five years old man's chance of coronary heart disease is approximately 2 times greater than a man with no risks. With three risk factors, this man's chance for getting angina, heart attack or sudden death is five times higher than if he had no risk factors [1]. In the study population, one risk factor was noted in 30.3% of total (35.5% of men and 25.4% of women), two risk factors in 35.5% of total (35.2% of men and 35.8% of women) and three risk factors or more in 26.4% of total (21.8 % of men and 30.5 % of women). Only 7.7 % of total (7.2 % of men and 8.3 % of women) was free from risk factors.

Smoking prevalence, recognized by the World Health Organization as an extremely serious health problem of the third world, was also extremely prevalent in male population (72%). This prevalence was even greater than that of the WHO-MONICA Project (34 - 62%) [8]. However, overall prevalence of smoking in this study was 49.7% which was comparable to that (47%) reported by Cardiovascular Disease Project (Myanmar) in 1993 [4]. Among the smokers, men had significant higher rate than that of women ($p < 0.001$).

The strong association between elevated blood pressure and coronary heart disease in men and women had been demonstrated in a number of prospective studies. A mean decrease of 6 mmHg diastolic blood pressure significantly reduced in fatal and nonfatal coronary heart disease by 14 % [2]. If hypertension is defined as blood pressure

equal to and greater than 160/95 mmHg, the prevalence rate of hypertension in the study population was 9 % which was much lower than that (14.5%) reported by Cardiovascular Project (Myanmar) in 1993 [4]. If hypertension is defined as blood pressure equal to and greater than 140/90 mmHg, the prevalence rates were 16.7% in men and 10.1% in women respectively. These values were also lower than those men (24 %) and women (17%) in rural population of India (9). In this study, hypertension was detected with male preponderance ($p < 0.015$).

Another modifiable factor hypercholesterolemia is a well known factor that 2 - 3% decline in coronary heart disease has been associated with 1% decline in serum cholesterol level [2]. Hypercholesterolemia (> 250 mg/ dl) was noted in 21.5% of the studied population and it was higher than that reported by Cardiovascular Disease Project (Myanmar) in 1993. If hypercholesterolemia is taken as > 200 mg/dl, it occurred in 57.7% of the study population, which was much higher than that (22%) of people in rural population of India. Hypercholesterolemia rate was found to be significantly greater in women than men ($p < 0.001$).

It had been mentioned in the report of Cardiovascular Project (Myanmar) in 1993 that obesity was not found in the studied Townships [4]. However if over-weight was defined as body weight having 6 lbs. above the height adjusted healthy body weight, 15.6% of women and 13.3% of men were found to be over-weight in this study.

Physical inactivity, whether occupational or recreational, is associated with increased risk of coronary heart disease independently of other risk factors. The relative risk of fatal heart attacks among sedentary individuals is approximately twice that of more active men and women. The mechanism whereby exercise apparently protects against coronary heart disease may include its effects on blood pressure, serum lipoprotein profiles, and obesity and insulin resistance [2]. In study population, half (50.2%) was found to have lack of regular physical activity and it was more marked in women (71.3%) than men (26.6%).

CONCLUSION

This study may provide some information to Cardiovascular Disease project concerning the prevalence of coronary heart disease risk in South Dagon Township. The study highlighted the important role of smoking and hypertension control in men and body weight, dietary control and regular exercise in women, in order to reduce coronary heart disease risk in South Dagon Township.

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A Malayan pit viper (*Calloselasma rhodostoma)* bite in Myanmar

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Malayan pit viper (*Calloselasma rhodostoma*) bite occurred to a young plantation worker of Yae, Mon state was described. He had severe local pain, swelling rapidly spreading from forearm to upper arm, shoulder and right upper chest. Systemic bleeding and neurotoxic symptoms were not detected. Admission blood was clottable. Variable sizes of blister and patchy areas of blackening were developed in right forearm and upper arm. By 6th day, extensive sloughing of the wound with patchy area of blackening occurred in forearm, upper arm and right upper chest wall exposing underlying structure. He had a continuous fever throughout the course of illness. Skin grafting attempted twice was unsuccessful. Antibody against Malayan pit viper was detected by enzyme immunoassay on sample taken on 54 days after the bite. Ninety percent of the wound healing occurred 300 days after the bite and led to contracture of the right upper limb.

INTRODUCTION

Snakebite occurs throughout States and Divisions of Myanmar with the exception of Chin and Kachin. Majority of the bites are due to Russell's viper (90%) and cobra bite constitutes about 4% [1].

A

Fig. 1. A picture of Malayan pit viper *(Calloselasma rhodostoma)*. (Reproduced with the permission of the author, Prof. David A Warrell)

Most medical officers posted throughout the country have seen Rusell's viper, cobra and green pit viper and not Malayan pit viper (MPV) (*Calloselasma rhodostoma)* (Fig. 1).

In 1996 we reported the first Malayan pit viper bite in Loikaw, Kayah State, Myanmar diagnosed as a Russell's viper bite and was confirmed retrospectively by detection of specific antibody using enzyme immunoassay technique [2]. In this communication, clinical features of another MPV bite occurred in Yae, Mon State was described.

CASE REPORT

An 18 yr old young adult of Mon nationality was bitten by a snake of 120cm long at the dorsal aspect of the right mid-forearm while he was picking up nuts from the ground in cashew nut plantation in Yae ye village (off kaw sar road), Yae, Mon State at 11 am on 10 February 1998. The fangs hanged on to the site of bite were removed with difficulty. Following that he noticed bleeding from the local wound. Four hours after the bite, he was brought to Yae Hospital. He was conscious but slow in response to questions and had a tourniquet applied at mid upper right arm. He had severe local pain and swelling of the forearm extending to the arm, shoulder and hand next day. Locally,

signs of inflammation were present. Further extension of the swelling to right upper chest was observed on the following day. The distance between 2 fang marks measured about 25mm. Clinically no features of systemic bleeding nor neurotoxic symptoms were observed. He had a blood pressure of 110/70mmHg and a pulse rate of 100/min. His admission blood was clottable and 6 ampoules of bivalent (Russell's viper and cobra) antivenom were given intravenously 15 minutes following admission. Response to questioning was said to be improved 4hr after the antivenom therapy. Eight variable sizes of blisters (10 to 50mm) and several patchy areas of blackening (about 50mm) appeared on the right forearm and upper arm on the 3rd day. Blisters ruptured on next day and wound debridement was performed on those blacken areas exposing raw under surface.

He was admitted to Thanbuzayat Hospital 6 days after the bite with an extensive infected wound measuring 150x75 mm spreading over the right forearm and hand with patchy areas of black discoloration and sloughing exposing underlying structures. He was referred to the orthopaedic unit of Mawlamyaing Hospital next day for skin graft and further management. At admission, the patient had extensive sloughing and discoloration of the whole right upper limb extending from hand to shoulder. Areas of blackening and foul smelling discharge were present. His blood pressure was 110/70mmHg and pulse rate 88/min. He had a continuous fever throughout his stay in the hospital. Skin grafting was attempted twice and failed. A picture taken on 54 days after the bite (Fig. 2) showed extensive sloughing of the skin of the whole dorsal surface of the right upper limb with areas of blackening and granulation. Wound healing had occurred in half of the limb at 75 days after the bite (Fig. 2).

Antibody against Malayan pit viper venom was detected in the serum sample collected on day 54 after the bite. The patient was discharged from the hospital 83 days after the bite upon request although a complete healing of the wound was not obtained. 90% healing has occurred at 300 days after the bite (Fig. 2). However, contracture of the limb following extensive scarring appeared.

Fig. 2. A picture showing extent of tissue damage in the patient on day 54, 75 and 300 following Malayan pit viper bite.

DISCUSSION

Although Malayan pit viper bite is common in Thailand, it has not been reported except one earlier report by our group [2]. In our case the victim was a cashew nut plantation worker. Most bites occurred to coffee and rubber plantation workers. Massive tissue destruction involving the whole limb preceded by bullae formation was observed in the present case and was also reported in other MPV bites in Thailand [3]. Clinical features of the patient includes local swelling, extensive necrosis and scarring [4] fits with MPV bite rather than Cobra which the victim claimed for the bite. In the early phase of envenoming, patient may present with clottable blood indicating defibrination has not developed yet which may explain the admission clotting status of the patient. However, if we have monitored the clotting state of the patient, we would have come across a state of defibrination. This extensive tissue sloughing without neurological deficit makes one suspicious of MPV bite that we have encountered before.

Although the inflicted snake could not be identified, retrospective detection of specific antibody by enzyme immunoassay confirmed the diagnosis.

It is possible that MPV could have been imported from Thailand through Myanmar-Thai border. Our medical officers are not aware of existence of MPV in Myanmar and these cases could easily be missed and treated as Russell's viper bite since the patient presented with incogulable blood as in the earlier case [2] or cobra bite as in this case with clottable blood at admission. Extensive tissue necrosis should make one suspicious of MPV bite especially in plantation workers living near Myanmar-Thai border. Only monospecific MPV antivenom should be used for treating specific bite. Russell's viper and cobra antivenom are of no value and should not be given.

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A study of the anti-inflammatory effect of *Zingiber officinale* Roscoe (Gyin-sein) on albino rats

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This study was aimed to investigate the anti-inflammatory activity of *Zingiber officinale* Roscoe (Ginger) on carrageenan-induced paw inflammation in albino rats. Both aqueous extract and ethanolic extract of the dried rhizomes of Ginger were used. Plethysmographic apparatus was used to measure the volume changes of carrageenan-induced rat's paws oedema. Anti-inflammatory actions of both extracts were investigated by using 3 dose levels i.e. 3g/kg, 1.5 g/kg, 0.75 g/kg body weight, orally and compared with that of aspirin 300mg/kg. Significant anti-inflammatory actions were found with both extracts of Ginger. It was found that the anti-inflammatory actions of both extracts were found to have dose-response relationship in nature. The results also indicated that anti-inflammatory action of ethanolic extract of Ginger was found to be superior to that of aqueous extract. But anti-inflammatory effects of both extracts of Ginger were inferior to that of standard reference drug, aspirin. The actions of ethanolic extract and aqueous extract were (0.49-0.66) times and (0.52-0.55) times that of aspirin respectively. Acute toxicity studies and general pharmacological screening tests of both extracts on albino mice showed no lethality and no abnormal changes. The actions of both extracts of Ginger may be due to one or more compounds obtained in these extracts i.e. saponins, alkaloids, resins, steroids and flavonoids according to the phytochemistry. Therefore, it can be concluded that both extracts of Ginger may be beneficial for use in joint pain and inflammation.

INTRODUCTION

Joint pain and inflammation are common problems among the people in the world. The non-steroidal (NSAIDs) and steroidal anti-inflammatory drugs are used in symptomatic treatment of joint pain and inflammation but have a number of undesirable side effects and toxicity [1]. Since there is yet no cure for arthritis in modern medicine, a large numbers of herbal drugs are being used for the treatment of arthritis in eastern countries like Myanmar, India and China. One of the medicinal plants, *Zingiber officinale* Roscoe (Zingiberaceae) (Gyin-sein) commonly known as "Ginger" has been reputedly used in Myanmar and Ayurvedic medicine for the treatment of inflammatory disorders [2, 3]. Mascolo-N *et. al.* [4] reported that an ethanolic extract of the rhizomes of ginger reduced carrageenan-induced paw inflammation in albino rats.

In Myanmar, in spite of its long historical use, scientific information regarding effective dose, efficacy and toxicity of Ginger have not been fully documented yet. Thus, the objective of this study was to determine the effect of Ginger on the carrageenan-induced inflammation of rat's paw so as to determine its potential therapeutic efficacy in the treatment of arthritis.

MATERIALS AND METHODS

Extraction of Zingiber officinale Roscoe (Ginger)

Powder of dried rhizomes of Ginger were extracted separately using 50% ethanol and distilled water to get the required ethanolic and aqueous extracts of Ginger. The dried extracts were dissolved in distilled water before administration to animals.

The acute toxicity study of Ginger extracts

The lethal activity and the determination of LD_{50} of the extracts of Ginger were done according to the standard method of Litchfield and Wilcoxon [5].

Fifty albino mice of both sexes, weighing (25-30g) were used in this study. They were divided into 5 groups and each group contained 10 mice. After overnight fast, five doses of ethanolic extract of Ginger were given orally to each group (i.e. 0.25 g/kg, 0.5 g/kg, 1 g/kg, 2 g/kg and 3 g/kg body weight). They were observed closely for 7 days after drug administration. Similarly, acute toxicity test of aqueous extract was also done as above.

General pharmacological screening tests of both extracts of Ginger

The standard method of Sandberg G. F [6] was used in this study. Both extracts of Ginger were tested for behavior, neurologic, and autonomic activity on albino rats following oral administration of different doses of extracts (i.e. 3 g/kg , 2 g/kg, 1 g/kg, and 0.5 g/kg).

In vivo experiment on albino rats

1. *Induction of inflammed paws in albino rats*

Freshly prepared suspension of Lambda carrageenan 0.1 ml (1.0% in 0.9% NaCl) was injected under the plantar aponeurosis of right hind paws of albino rats to produce acute inflammation. Oedema formation was regarded as an indicator of inflammation. The volume of the paw was measured by plethysmometer (i.e., differential volume measuring instrument). The measurement of the paw volume was done immediately before and every one hour interval up to six hours after carrageenan injection [7].

Paw volume was measured by immersion of the foot in wetting fluid i.e. normal saline to an ink mark at the level of the lateral malleolous. The volume of paw was expressed in terms of milliliter (ml).

2. *Carrageenan-induced inflammation on right hind paws of albino rats (control group)*

In this study, female albino rats (Wistar strain) weighing 130-230g maintained on the same standard laboratory diets were used. A total of 10 rats were used and they were fasted overnight about 16 hours before the experiment.

3. *The effects of both extracts of Ginger and standard reference drug, acetylsalicylic acid (aspirin) on carrageenan-induced paws inflammation*

The above procedure was repeated with both extracts of Ginger and standard reference drug, aspirin. Three dose levels of ethanolic and aqueous extract (i.e., 3 g/kg, 1.5 g/kg, and 0.75 g/kg) were used to each group of rats.

One positive control group in which standard drug, aspirin, 300 mg/kg was given. All drug vehicles and extracts were given orally, one hour before sub planter injection of Lambda carrageenan.

4. *Determination of ED_{50} of anti-inflammatory effects of both extracts of Ginger*

The ED_{50} of both extracts were determined by using the standard method [5]. ED_{50} was calculated from the volume reduction effect

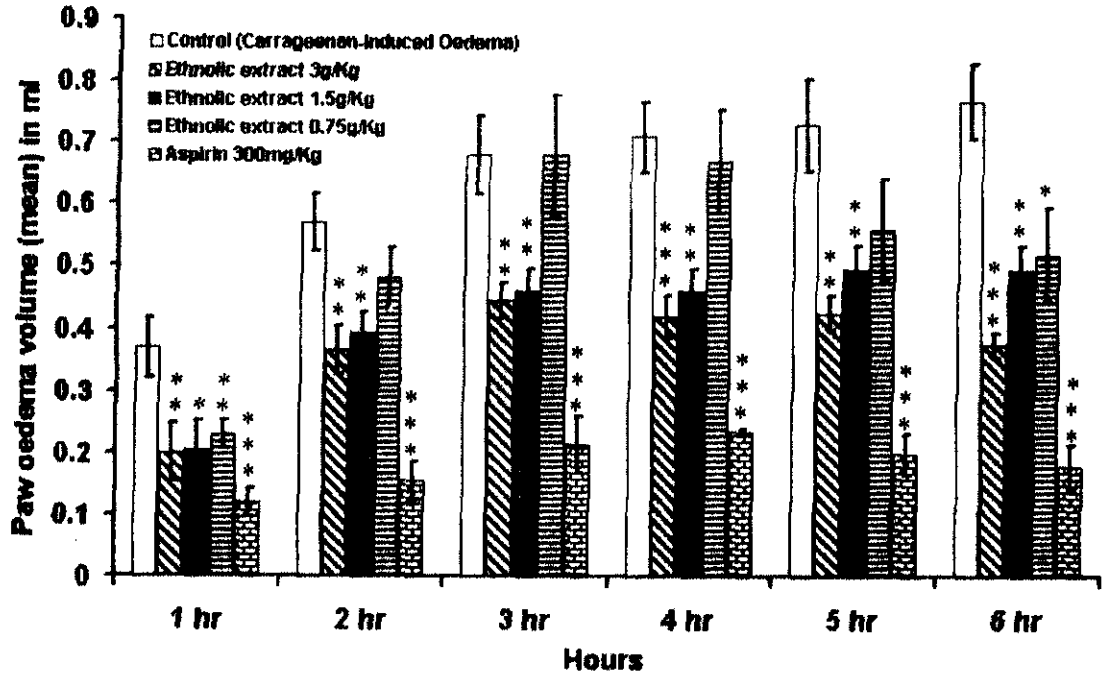

Fig. 1. Effects of ethnolic extracts of *Zingiber officinale* Roscoe and standard drug (Aspirin) on carrageenan-induced paw oedema volume (mean) in ml (mean ± S.E) (n=10) (statistical comparison between control and tested groups - * P<0.05, ** P<0.01, ***P<0.001)

of both extracts of Ginger on right hind paw of albino rats at three dose levels (i.e. 0.75 g/kg, 1.5 g/kg, 3 g/kg).

Phytochemical analysis of both ethanolic and aqueous extracts of Ginger

Both ethanolic and aqueous extracts of Ginger were tested qualitatively for the presence of saponins, alkaloids, resins, tannins, cyanogenic glycosides, starch and flavonoids by using the standard method [8].

Data management and analysis

Unpaired student 't' test was used to observe the significance of difference between the means of control and experimental groups.

RESULTS

Extraction of rhizomes of Zingiber officinale Roscoe (Ginger)

Both the aqueous and ethanolic extraction of dried rhizomes powder of Ginger (100 g) yielded 15 g/100 g or 15%.

Acute toxicity study of Ginger extracts

The acute toxicity tests showed no lethality in mice observed up to 7 days, even with the maximum doses (3 g/kg) of the both aqueous and ethanolic extracts. Thus, both extracts of Ginger were considered non-toxic up to the dose level of 3 g/kg and the median lethal doses (LD_{50}) of both extracts were greater than 3 g/kg.

General pharmacological screening tests of both extracts of Ginger

In present study, no abnormal motor activities, screen grips and gaits were observed and neither fit nor tremor was detected. No other abnormalities were seen.

Effect of carrageenan on right hind paws of the albino rats

The effects of carrageenan on right hind paws of the albino rats were shown in Fig 1. Sub plantar injection of 0.1 ml of 1% carrageenan produced statistically significant rise in paw oedema volume, starting from 1 hour up to 6 hours after carrageenan injection (P<0. 001).

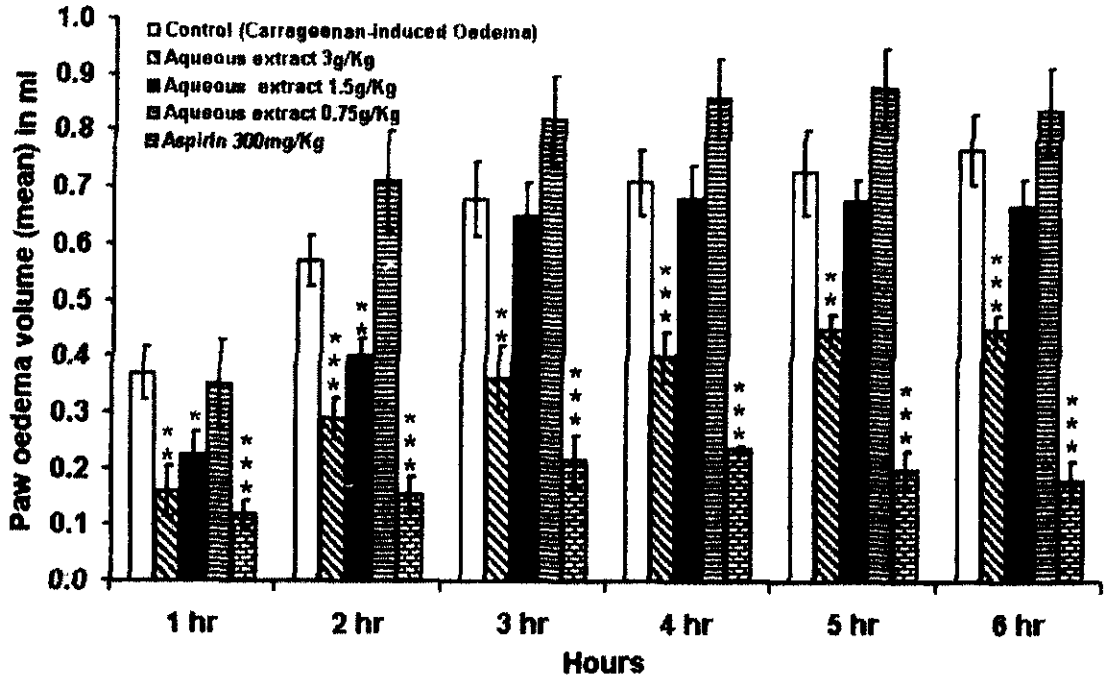

Fig. 2. Effects of aqueous extracts of *Zingiber officinale* Roscoe and standard drug (Aspirin) on carrageenan-induced paw oedema volume (mean) in ml (mean ± S.E) (n=10) (statistical comparison between control and tested groups - * P<0.05, ** P<0.01, ***P<0.001)

The effects of both extracts of Ginger and standard drug, aspirin on carrageenan - induced paws oedema

The results of ethanolic extract of Ginger were shown in Fig. 1. Ethanolic extract of Ginger, at the dose level of 3 g/kg and 1.5 g/kg, showed statistically significant decrease in rats' paws oedema volumes compared with the control. This was found to start from 1 hour to 6 hours (P<0.05-P<0.001) after carrageenan injection. With 0.75 g/kg of ethanolic extract, statistically significant decrease in paw oedema volume was found at 1 hour (P<0.01) and at 6 hours (P<0.05) only.

In Fig. 2, aqueous extract of Ginger, at the dose level of 3 g/kg showed that statistically significant decrease in rat's paws oedema volumes compared with control were found to start from 1 hour to 6 hours (P<0.01-P<0.001) after carrageenan injection. With 1.5 g/kg of aqueous extract, statistically significant decrease in paw oedema volume was found at 1 hour (P<0.05) and 2 hours (P<0.01) only. With 0.75 g /kg of aqueous extract, there was no statistically significant decrease in paw oedema volume compared with control group.

Aspirin (acetylsalicylic acid 300 mg/kg) showed that statistically significant decrease in paw oedema volume was found at 1 hour after carrageenan injection up to 6 hours (P<0.001).

ED_{50} of anti-inflammatory effects of both extracts of Ginger

The result of ED_{50} of ethanolic extract of Ginger was 0.98 g/kg and its confidence limit was (0.81 g/kg-1.186 g/kg). ED_{50} value of aqueous extract of Ginger was 1.2g/kg and its confidence limit was (1.026 g/kg-1.404 g/kg).

Phytochemical analysis of both extracts of Ginger

Phytochemical study of Ginger had shown that both extracts of ethanolic and aqueous extracts of Ginger contained saponins, alkaloids, tannins, steroids and flavonoids.

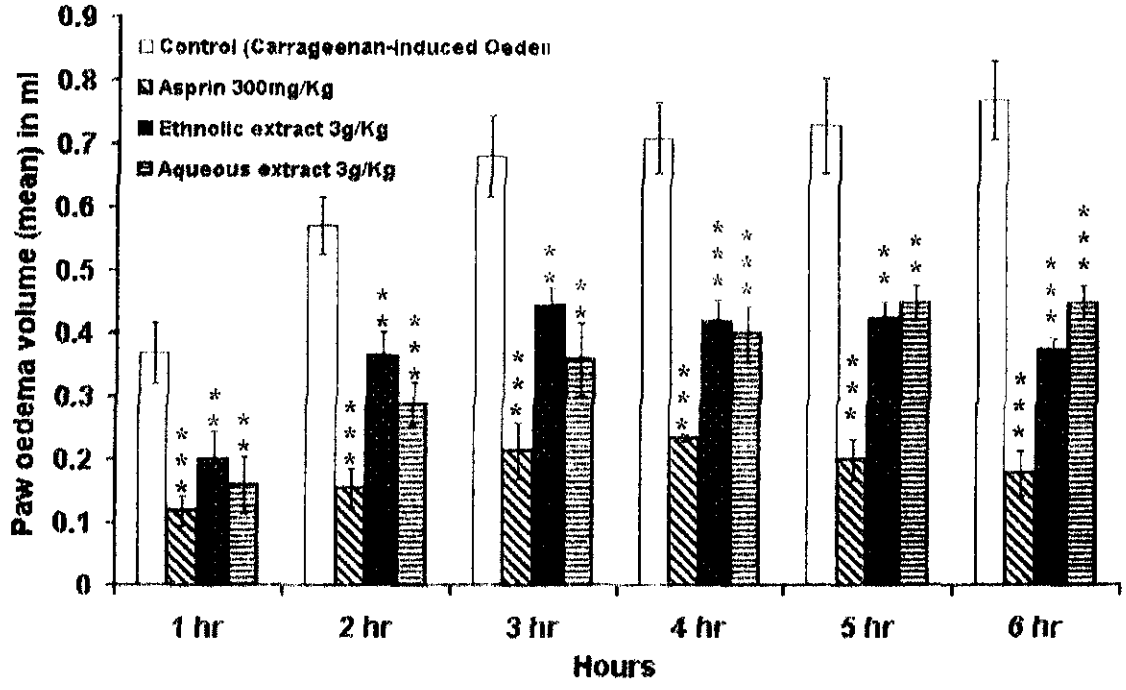

Fig. 3. Effects of ethanolic and aqueous extracts of *Zingiber officinale* Roscoe and standard reference drug (aspirin) on carrageenan-induced paw oedema volume (mean + S.E) (n=10) (statistical comparison between control and tested groups - * P<0.05, ** P<0.01, ***P<0.001)

The 50% ethanolic extract also contained resins (Table 1).

Table 1. Phytochemical analysis of both extracts of Ginger

No.	Compounds	50% Ethanolic extract	Aqueous extract
1.	Saponins	+	+
2.	Alkaloids	+	+
3.	Tannins	+	+
4.	Flavonoids	+	+
5.	Steroids	+	+
6.	Resins	+	-
7.	Cyanogenic glycosides	-	-

+ Presence - Absence

DISCUSSION

To study the anti-inflammatory effect, carrageenan-induced inflammation on hind paw of albino rat was used as an acute inflammation model. Both ethanolic and aqueous extracts of Ginger were used in this study. Aspirin was used as standard reference drug for comparison of anti-inflammatory actions of Ginger extracts.

According to the results, both extracts of Ginger on albino mice showed no acute *toxic effects up to the dose level of 3g/kg.* Therefore, both extracts can be said to be free from acute toxic effect.

The results showed that both extracts of Ginger had significant anti-inflammatory *actions and also had dose-response* relationship in actions (P<0.05-P<0.001). It was found that ED_{50} value of ethanolic extract was lower than that of aqueous extract. The result also showed that the anti-inflammatory actions of ethanolic extract *was greater than that of aqueous extract* (P<0.01-P<0.05) (Fig. 3).

Even though both extracts of Ginger showed significant anti-inflammatory actions, the actions were found to be inferior to that of aspirin (i.e. ethanolic extract and aqueous extract were found to be 0.49-0.66 times and 0.52-0.55 times that of aspirin respectively).

Steroids, alkaloids, phenolic compounds, saponins, resin and flavonoids were reported that they could give anti-inflammatory action [9]. So, the actions of both extracts of Ginger may be due to one or more compound obtained in those extracts (i.e. saponins, alkaloids, resins, steroids and flavonoids constituents of Ginger as shown in the phytochemistry study).

Gingerol, the only known active principle of Ginger has been reported to be a resin with oily liquid [10]. The presence of resin in the ethanolic extract may be the reason why its action was more potent than that of aqueous extract.

Both extracts of Ginger at the dose level of 3 g/kg, showed significant anti-inflammatory effects started from 1 hour up to 6 hours after sub plantar injection of carrageenan on the hind paws of albino rats. The patterns of inhibition of both extracts were similar to that of standard drug, aspirin. Therefore, the mechanisms of anti-inflammatory actions of both extracts were suggested to be similar to that of aspirin.

In conclusion, the results of the above experiment have provided useful preliminary information on use of Ginger in the treatment of joint pain and inflammation.

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Neutralisation of biological activities of Russell's viper (*Daboia russelii siamensis*) venoms from different localities of Myanmar by monospecific antivenom

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Neutralisation of biological properties of Russell's viper venoms from 5 divisions of Myanmar namely Mandalay, Magwe (Upper Myanmar), Yangon, Bago, Ayerawaddy (Lower Myanmar) by a monospecific antivenom was studied by WHO recommended methods of neutralisation in rodent. In general, 2 to 8 times more antivenom is required to neutralise different biological activities of the venoms of Upper Myanmar compared to the Lower. Forty times more antivenom is needed to neutralise procoagulant activity of the venom of Taungdwingyi (Magwe Division) compared to that of Daedaye (Ayerawaddy Division). The antivenom is equally effective in neutralising procoagulant activity of the venom of Wundwin (Mandalay division). Variable neutralisation of the properties of venom by the antivenom among venoms of Lower Myanmar is probably due to intra divisional variation in venom properties. The observation calls for use of widely pooled venoms in raising antivenom for common use.

INTRODUCTION

Russell's viper (*Daboia russelii siamensis*) bite occurs in rice growing divisions of Myanmar. Monospecific antivenom manufactured by Myanmar Pharmaceutical Factory (MPF) is used for treating Russell's viper bite cases throughout Myanmar. The source of venom used for raising antivenom is mainly derived from venoms collected from Russell's vipers caught in Yangon, Bago and Ayerrawaddy divisions (Lower Myanmar) which tend to vary from year to year. However, recent observations of geographical variation of Russell's viper venom [1-5], variation of venom neutralising efficacy of a batch of mono specific antivenom against venoms from 3 different localities of Myanmar [6] and variable performance of antivenom in correcting coagulation defect in Russell's viper bite cases of different localities of Myanmar [7-10] prompted us to do this study.

MATERIALS AND METHODS

Characterisation of the venoms

Russell's vipers caught from five divisions of Myanmar namely Mandalay, Magwe (Upper Myanmar), Yangon, Bago, Ayerawaddy (Lower Myanmar) were housed separately and kept in the snake firm of MPF. Individual snake was milked, lyophilised and pooled according to locality and length into young (<90cm) and adult (>90 cm). Pooled venom of adult vipers of Mandalay Division (Wundwin n=2), Magwe (Taungdwingyi n=4), Yangon (Kungyankone n=25), Bago (Tharawaddy n=14) and Ayerawaddy (Daedaye n=7) were stored in dark at 41°C. Characterisation of the biological properties of the venoms such as lethal (LD_{50}iv), coagulant (MCD), defibrinogenating (MDD), necrotic (MND), haemorrhagic (MHD) and capillary permeability increasing (MCPID) was determined according to WHO

recommended methods [11]. Lyophilised antivenom was reconstituted, aliquoted and stored frozen at -20°C until tested.

Venom-antivenom neutralisation test

Monospecific antivenom, batch no. DN 86608B exp. 4/92 was used for neutralisation test in rodent according to WHO standard tests of neutralising activity [11]. For venom-antivenom neutralisation test, $5LD_{50}$iv, 10MCD, 3MHD, 3MND, 5MDD and 100 MCPID doses were used. Briefly, a fixed amount of venom is mixed with variable dilutions of antivenom, mixed, incubated at 37°C for 30 min and then injected into the laboratory animals. The median effective dose (ED_{50}) is taken as the amount of antivenom required to neutralise 50% of the biological activity of venom [11].

RESULTS

Venom doses used for neutralisation of the antivenom are shown in Table 1.

Results of venom neutralising dose of the antivenom with venoms from 5 different divisions of Myanmar are shown in Table 2. It is observed that in general 2 to 8 times more antivenom is needed to neutralise different biological properties of the venoms of Upper Myanmar (Magwe and Mandalay) compared to Lower Myanmar (Tharawaddy, Kungyankone and Daedaye). Forty times more antivenom is needed to neutralise procoagulant activity of the venom of Taungdwingyi (Magwe) compared to the Daedaye (Ayerawaddy). However, it is equally effective in neutralising procoagulant activity of the venom of Wundwin (Mandalay). It was observed that two to four times more antivenom is needed to neutralise lethal and defibrinogenating and 2-4 times less for necrotic and capillary permeability increasing activities of the venom of Kungyankone (Yangon) in comparing venom neutralising efficacy of the antivenom among the venoms of Kungyankone (Yangon), Tharawaddy (Bago) and Daedaye (Ayera-waddy) (Lower Myanmar).

DISCUSSION

The study highlights that more antivenom are needed to neutralise biological activities of the venoms of Upper Myanmar (Taung-dwingyi and Wundwin) compared to Lower Myanmar (Tharawaddy, Kungyankone and Daedaye). It has been reported that more antivenom were needed to neutralise

Table 1. Venom doses used for venom-antivenom neutralisation test

Source of venom	$5LD_{50}$iv µg/mouse	10MCD µg/ml	3MHD µg/rat	3MND µg/rat	5MDD µg/mouse	100MCPID µg
Mandalay Division Wundwin	16.9	31.62	135.2	112.5	15.0	0.295
Magwe Division Taungdwingyi	19.9	50.12	92.7	97.1	6.0	0.832
Bago Division Tharawaddy	23.4	25.12	126.5	119.4	12.0	0.724
Yangon Division Kungyankone	30.2	31.25	79.0	70.3	25.5	0.115
Ayerawaddy Division Daedaye	14.3	1.35	84.5	83.6	8.9	0.892

LD_{50}.iv=Median lethal dose
MCD = Minimum coagulant dose
MHD = Minimum haemorrhagic dose
MND = Minimum necrotic dose
MDD = Minimum defibrinogenating dose
MCPID= Minimum capillary permeability increasing dose

Table 2. Amount of antivenom required for neutralising biological properties of venoms from different localities of Myanmar

Source of venom	5LD $_{50}$iv µl	10MCD µl	3 MHD µl	3 MND µl	5 MDD µl	100 MCPID µl
Magwe Division Taungdwingyi	10	2.5	20	20	1.25	20
Mandalay Division Wundwin	10	0.078	20	20	1.25	20
Yangon Division Kungyankone	5.0	0.0625	0.625	2.5	2.5	1.25
Bago Division Tharawaddy	2.5	0.0625	2.5	2.5	0.625	2.5
Ayerawaddy Division Daedaye	2.5	0.0625	2.5	2.5	0.625	2.5

biological activities of Taungdwingyi venom compared to Daedaye [12]. Since venoms used for raising antivenom for common use is mainly derived from pooled venoms of lower Myanmar, a better neutralisation with the venoms from Lower Myanmar was observed in this study. The fect that antivenom raised with local venom is good for use in that locality was observed by Phillips et al (1988) [13] where Indian Haffkine antivenom failed to correct coagulation defect produced by bites of Ceylonese Russell's viper (*V. russelii puchella*) and up to 530ml of the antivenom was proved to be necessary for restoring haemostatic defect. Jayanthi and Gowda (1988) [14] indicated that there was lack of protection afforded in Russell's viper bite victims from southern India when given Haffkine antivenom. All observations called for use of antivenom raised with local venoms, or local antivenom raised with venoms from Upper or Lower Myanmar, if possible, or common antivenom raised with widely pooled venoms from different localities since there is geographical variation in composition of venoms [15].

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Community-based study on awareness and practice of care givers regarding Dengue Haemorrhagic Fever in Thaketa Township, Yangon

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The study was conducted in Thaketa Township involving the 405 respondents of age 18 years and above. The majority got medium scores. The mean knowledge and practice scores of the caregivers were not statistically different whether there was a primary DHF case at home or not. Almost 60% of the interviewees got DHF message by watching television and they recommended that it was the most effective media. Persons who had access to radio, television, newspapers and journals got higher chance than those who had not. Radio is still a valuable tool in health education process in semi-urban area where electricity is running out. Less than 15% was exposed to none of the Information, Education and Communication (IEC) materials. More than six years of schooling, being currently married, access to television, radio, newspapers, and journals were significantly related to total scores. Larva was found in 67% of water storage tanks and 15.9% of flower vases according to the observation checklist. Community members were more interested how DHF was transmitted to the child rather than the *Aedes* mosquito. Low practice score (65%) was associated with high knowledge level, indicating that high knowledge did not necessarily lead to correct practice. Less than half of the subjects had seen posters and pamphlets. IEC materials need to improve in way of presenting messages and should be sufficiently distributed in the community.

INTRODUCTION

Dengue is an urban disease, but it is becoming rural. About 50-100 million cases of dengue fever were estimated annually. Almost 500,000 Dengue Haemorrhagic Fever (DHF) cases require hospitalization each year, of which 90% are children less than 15 years of age. Mortality averages 5% of DHF cases and epidemics are cyclical [1].

DHF is a severe, often fatal, febrile disease characterized by abnormalities of haemostasis, and in severe cases, a protein losing shock syndrome. The incidence of DHF is greater by far in Asia than in the Americas. DHF continues to be a serious public health problem and a major cause of hospitalization and death among children in many Asian countries [2].

DHF is one of the Diseases Under National Surveillance and is also enlisted as 17th priority disease in Myanmar National Health Plan (1996-2001). One of the strategies stated in NHP includes IEC by production of guideline for Basic Health Staff (BHS) in prevention and control of DHF. DHF is endemo-epidemic in many places, 12 out of 14 States and Divisions in Myanmar [3].

Breeding sites cited by respondents include roof gutters apart from containers, receptacles, vases, flower pot plates, and

bamboo holders [4]. In Myanmar, health education in the form of health talks are routinely carried out in schools and in the community. Before and during epidemic season, health messages are informed through radio, television and newspapers.

WHO guidelines on Global Strategy for Control of DF/DHF vectors included:
(1) Selective integrated mosquito control with community and intersectoral participation (2) Active disease surveillance based on a strong health information system (3) Research on vector control, etc [5].

This study will provide some recommendations for existing IEC materials regarding DHF: source reduction and early symptom of DHF. Community participation on case information and vector control will be enhanced. Awareness of caregivers for early referral can prevent severe complication of DHF which in turn leads to reduction of mortality.

Objectives

The general objective was to assess the awareness and practice of care givers regarding DHF in Thaketa Township in Yangon. The specific objectives were to identify the awareness and practice of care givers on DHF, to assess the source of knowledge, and to recommend for existing IEC materials.

METHODOLOGY AND DESIGN

A community-based cross-sectional study was conducted in Thaketa Township, involving 405 subjects of age 18 years and above. Care givers were those who took care of the children at home or at the health center or at the clinic. Thaketa Township, one of the hyperendemic regions in Yangon Division, was purposely selected because there were 3 deaths out of 182 cases from January to July, 2002. Four wards were randomly selected out of nineteen.

Both quantitative and qualitative data collection methods were used.

Semi-structured questionnaire was used for interviews of community members after obtaining an informed consent. The households where a child was residing were selected randomly. In these households, we chose one subject from each household, regardless of sex. The respondent must be a relative of the child. No specific exclusion criteria were employed. Mothers were the priority group in the interview. If the mother was not present at home during the interview, another household member (father/ grandfather/ grandmother/ brother/ sister/ uncle/ aunt) was requested to answer the questions. Samples from each of four wards were taken proportionately based on total population of each ward. Data collection tools were pre-tested. The observation checklist was also used to support the findings.

For qualitative data collection methods, focus group discussions (FGDs) were performed to explore the view on existing IEC among BHS, General Practitioners, Maternal and Child Welfare Association (MCWA) members, other volunteers including Ward Law and Order Restoration Council members, and voluntary fire brigade members.

Double data entry, checking, and cleaning were performed using EPI-INFO 6.0, and data analysis was conducted using SPSS 10.0. $P < 0.05$ was used as the definition of statistical significance. The study lasted one year starting from June 2002.

RESULTS

Sex ratio of male and female respondents was 1:7. Mean age was 35.9±10.3 years. Participants aged 18-35 years were more than those over 35 years (53.6% vs. 46.4%).

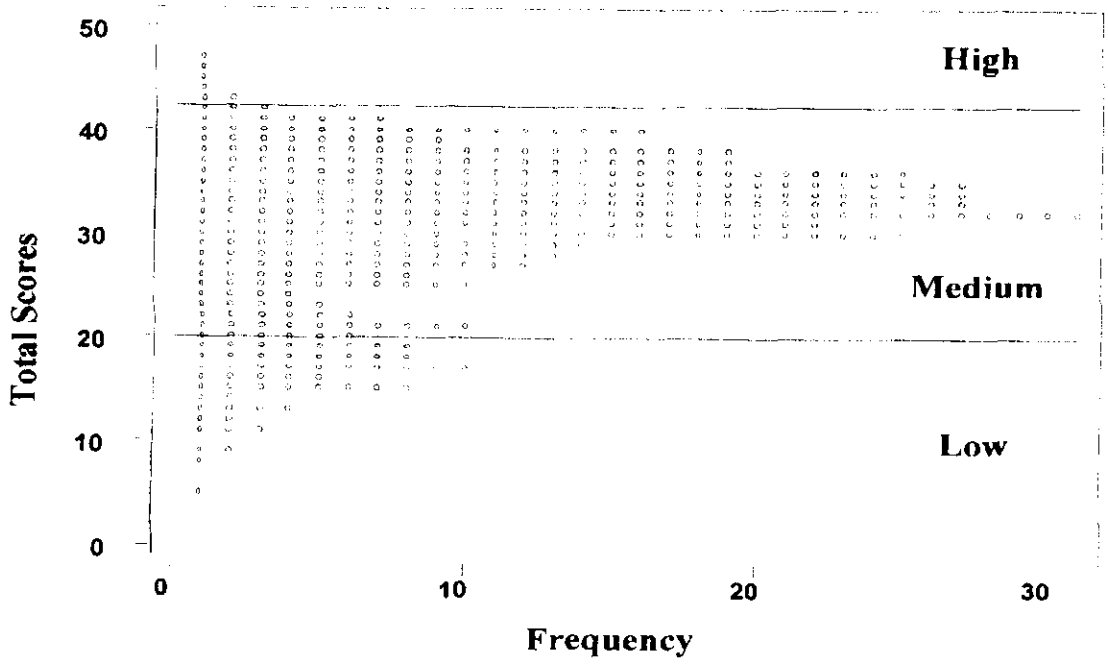

Fig.1. Total scores of the respondents

Most study subjects were married (93.6%), mothers (78%) and literates (97.3%). Only 8.6% reported having had received ≥ 12 years' school education. Nearly three-fourths of the subjects were dependents. Nearly 40% lived in their own house and majority of the houses were built with wood (71.1%). Most of the households (77.8%) had one to two children under 15 years of age. Only 34 (8.4%) of the households participated in the interview had children with history of DHF.

Total score was categorized as low (0-20), medium (21-42) and high (43-62). The majority (83.7%) got medium scores (Fig. 1).

The difference of mean score between male and female was not statistically significant (p value = 0.271).

Knowledge scores were computed across 20 questions.

DHF is common in 3-8 years of age (44.4%). Majority (81.7%) replied that DHF was transmitted by the mosquito bite, whereas only 204 (61.6%) definitely knew the vector of DHF as *Aedes*. It usually bites in daytime (80.4%). It breeds in clean and clear water (40.8%). *Aedes* can breed inside the house (76.4%). The common breeding sites stated were flower vases (56.7%) and ant traps (37.8%). *Aedes* also breeds outside the house (87.7%), mostly in water containers (61%), old tyres, broken pots, coconut shells (25.7%) and blocked gutters (2.2%). High transmission was found in rainy season (85.9%). DHF was a fatal disease (94.3%). There was no vaccine available for prevention of DHF (20.2%). The previously infected child may suffer second attack of DHF (72.3%). If the child had fever, DHF should be aware (64.7%). Signs and symptoms of DHF were fever (57.3%), vomiting (51.6%), purpura (36.3%), drowsiness (28.1%) and cold extremities (17%), etc. Mean ± SD of knowledge scores was 20.71±6.92.

Practice scores were computed across 11 curative and preventive action..

Initial home care management of the feverish child was the use of medicine (56.8%), consulting the health staff (33.3%), tepid sponging (14.3%), and the use of ORS solution (1.7%). Paracetamol was used as

the main drug to lower down the temperature (84.8%) and none of them gave any analgesics. Half of the respondents emptied the water containers once in three days. They brushed thoroughly the rim and inner side (29.4%), covered the water containers tight (26.9%). If larva was found in the water container, they removed larva (13.6%), drained out water (72.8%), and add larvivorous fish (9.6%). Flower vases were emptied once in three days (47.4%). Gutters were not cleared regularly (47.9%). Unused utensils were discarded (51.4%). Mean ±SD of practice scores was 9.48±3.04.

Table 1. History of primary DHF cases at home and scores of the care givers

Scores	Primary DHF cases at home	Mean ± SD	P value
Know-ledge score	present	21.09 ± 7.13	0.742
	absent	20.68 ± 6.91	
Practice score	present	9.62 ± 3.27	0.832
	absent	9.52 ± 2.57	

Mean knowledge and practice scores of the care givers were not statistically different whether there was a primary DHF case at home or not (Table 1).

Table 2. Knowledge scores and practice scores

Know-ledge scores	Practice scores		Total	P value
	Low	Medium & high		
Low	92	35	127	0.164
	72.4%	27.6%		
Medium & high	182	96	278	
	65.5%	34.5%		
Total	274	131	405	
	67.7%	32.3%		

Though knowledge scores were high in some respondents, practice scores were markedly low (65.5%) (Table 2).

The community members used mosquito net (47.9%), used repellants (47.2%), wore long sleeves (12.6%), use other methods (8.6%), and none (5.2%).

The interviewees obtained DHF information by watching television (60.7%), by listening to the radio (33.8%), by reading the pamphlets (48.6%), by reading the newspapers/journals (32.85%). Less than 15% was exposed to none of the IEC materials. The facts in those IEC were concise and easily recognized (78.3%). They recommended that television was the most effective media for dissemination of knowledge regarding DHF in the community.

As seen in Table 3, more than six years of schooling as well as being currently married were the only two respondent's characteristics significantly related to the total scores. Survey respondents who had 6-20 years of schooling were twice more likely to obtain high scores than those with 0-5 years of schooling. The total scores were high among the currently married compared with the unmarried, and the difference was statistically significant. Respondents who were exposed to health education media such as television, radio, newspapers, and journals captured high scores than those who had not. The chance was significantly higher among respondents who watched television (three times higher) than those who did not.

We counterchecked some responses by the observation checklist. Nearly 55% of households had two to three water containers. Although 46.5% of water containers had the lids, only 19% were covered tight. Larva was found in 67% of water storage tanks and 15.9% of flower vases at the time of interview. Gutter blockage was observed (3.2%). Old tyre, coconut shells and tins were found in the compound and the larva existed in half of

Table 3. Logistic regression model of total scores, by respondent's characteristics, and exposure to health education media

Variables	(n)	Percent	Odds ratio (95% confidence interval)
Respondent's characteristics			
Marital status			
- currently unmarried (*r*)	26	6.4	1
- currently married	379	93.6	3.83(1.041-9.130)*
Years of formal schooling			
- 0 to 5 (*r*)	133	32.8	1
- 6 to 20	272	67.2	2.134 (1.135-4.010)*
Mean years of schooling	7.6±3.6		
Exposure to health education media			
Radio			
- not listened (*r*)	268	66.2	1
- listened	137	33.8	4.467 (1.463-3.641)**
Television			
- not watched (*r*)	159	39.3	1
- watched	246	60.7	3.839 (1.906-.733)***
Newspaper/journal			
- not read (*r*)	272	67.2	1
- read	133	32.8	2.890 (0.943-8.853)

*Significant at $p<0.05$; **$p<0.01$; ***$p<0.001$, (*r*) = Reference category.

these solid wastes.

Findings on FGDs were presented in a short report elsewhere.

DISCUSSION AND RECOMMENDATIONS

Above findings showed that community members had considerable knowledge particularly on transmission of DHF by mosquito bite, biting time of *Aedes*, and little knowledge on main vector of DHF (*Aedes*). Half of them replied that *Aedes* breed in polluted water. Most of the interviewees responded that common breeding sites of *Aedes* were the water containers and flower vases. Ant traps, broken pots, tins, old tyres, coconut shells were moderately known breeding places. Blocked gutters were the least known breeding site. Almost all participants were aware that DHF had fatal tendency. Nearly 80% thought that vaccine against the disease was available. The majority applied measures to prevent the child from biting of mosquito and very few percentages used none. Points that should be highlighted for the community awareness are:

- *Aedes* is the main vector for DHF.
- *Aedes* only breed in clear water and not in polluted water.
- Blocked gutters are the possible breeding sites for *Aedes*.
- There is no vaccine for prevention of DHF nowadays.
- Sustainability of larva control measures is a must.

No statistical significance was found in knowledge and practice scores of male and female interviewees. However, the married got more chance to obtain high scores than the unmarried. The married were more enthusiastic and interested in DHF disease itself, preventive and control measures, than the unmarried as they had to take care of the children. The higher the year of schooling,

the better the chance to get high scores.

The caregivers with low educational level should be targetted for health education. The practice responses included real practice and intended practice. It indicated that most people are aware of DHF, irrespective of the presence or absence of a previously infected child in their family. Low practice score was observed among those with high knowledge level, which means that high knowledge does not necessarily lead to high practice. Barriers in behavioral change should be searched in further studies.

There were very few respondents who gave sponging and ORS when a child was febrile. And also, those who carried out larva control measures, and protected the child from mosquito bite during daytime were the minority group. It needs to investigate in detail for underlying reasons of why people fail to carry out corrective actions in caring the sick child, larval control, and protection from mosquito bite at daytime. Moreover, ORS should be promoted in home care of feverish child.

Less than half of the subjects had seen posters and pamphlets. Sufficient numbers of IEC materials should be distributed in the community.

Few interviewees were not exposed to any type of existing IEC. It needs to find ways to improve the exposure by discussions with community members and health workers through participatory approaches.

Persons who had access to radio, television, newspapers and journals got higher chance than those who had not. Television is the most effective media for the public and various forms of telecast, such as songs, comedies, short movies with famous actors, actress, etc. apart from discussions and health talks. Radio is still a valuable tool in health education process because in many places in semi-urban area. Specific IEC messages should be included through multiple channels. Choice of media by the VBDC Programme is important. Television spots, and radio programmes should be arranged and it is necessary to assess the effectiveness. Further improvement of newly drafted IEC is a necessity.

Although many houses had at least two to three water containers, they were not covered tight to prevent from larva breeding. Larva were inspected in many tanks, and also in flower vases, gutters, and solid wastes. Social mobilization for sustainability of larva control activities should be implemented. Advocacy of volunteers for larval control, and partnership with local NGOs should be strengthened. Moreover, studies on how to motivate the people to sustain larva control measures, and how to promote an access to DHF information, are necessary.

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Developing a methodology to monitor health care utilization by less well-to-do rural mothers at a township level in Myanmar

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The study aims to develop and field test a culturally relevant rapid assessment methodology, for use by township level health services managers in Myanmar to monitor health care utilization by less well-to-do rural mothers in a township. Micro-area approach was used and area targeting was first made choosing the least developed Rural Health Center area in a township. Culturally relevant household targeting criteria to target less well-to-do families and locally relevant maternal health care indicators were incorporated in developing a data collection tool. A rapid cluster survey, using probability proportional to size sampling procedure, was conducted using the monitor tool. Mothers of 450 infants born alive during prior two years of the time of survey were sampled from 50 clusters. Based on findings of the rapid survey, a discussion is made as regards practical applicability of the methodology at a township level in Myanmar.

INTRODUCTION

Health for all (HFA) in the 21st century aims to promote the highest attainable levels of human health as a fundamental human right, necessitating global health policy to be driven by equity, human rights and gender sensitivity [1]. Promoting equity aims to create equal opportunities for health and to decrease differentials in health status (reducing the social gaps in health and health care). Disparities between class, gender, race, geographical location and age in health care access have been highlighted [2].

In developing countries as well as in prosperous countries, routine methods of reporting, analyzing and presenting data obscure the gaps between different social groups in geographical areas. The policy implications of health disparities were thus rarely made clear enough in ways useful for busy decision-makers [2]. It is also important to create a new management system that would generate useful information for planning, implementation and evaluation of district health services.

Maternal care has been one of essential health provisions from before Alma Alta declaration till now and will continue to be so in the future. Monitoring and improving health and health care, at least essential health provisions, of socially less advantaged people is a key strategy in minimizing the disparities in health and health care of a community.

The aim of the study is to develop a culturally relevant rapid assessment methodology, for use by township level health services managers in Myanmar, to monitor health care utilization of less well-to-do mothers in a township. By using the method, it is expected to generate information to improve micro- planning, and thus of health development, in a township. It is also expected that the use of the method itself will promote conscientization of community members on health equity as their fundamental right.

MATERIALS AND METHODS

Study phases

The study methodology drew on methodological components of a doctoral thesis [3]. The study consisted of two phases, Phase I and Phase II. In Phase I, a qualitative ethnographic study was performed to understand the cultural context of rural communities in relation to maternal and child health care. In the same phase, a validation study, using qualitative as well as quantitative methods, was done to validate culturally/locally relevant variables (*housing, land ownership and* occupation) to identify different socio-economic groups in the rural community chosen. In Phase II, a cross sectional survey, after developing a data collection tool, incorporating maternal health care indicators, for use by local health services managers, was conducted employing quantitative rapid survey principles.

This paper is confined only to the findings that emanated from the quantitative rapid survey.

Study area

Taikkyi Township in Yangon Division was chosen purposely as the study township to test the methodology. Among different Rural Health Center (RHC) areas within the township, Sann-Ywa RHC area, considered economically least developed area within the township, was chosen after discussions were made with local authorities of the township - Taikkyi Township Peace and Development Council, Health Department, Fisheries Department, Immigration and Manpower Department, and Agriculture and Irrigation Department.

Reference and study population

The reference population was socio-economically less advantaged mothers of rural area of the township chosen; the study population was economically less advantaged mothers in the selected area who gave births during past 2 years.

Sampling

Sampling population was defined as mothers having at least one child under 2 years of age and whose household fell into socio-economically less advantaged group in the selected rural area.

Sample size

A sample size of 450 was taken. The calculation was made using the following formula taking into consideration that the total population size of any RHC area in rural Myanmar is higher than 10,000 [4, 5]

$$n = (z^2 pq)/d^2$$

where:

n = the desired sample size (when population is greater than 10,000);

z = the standard normal deviate, usually set at 1.96 (or more simply at 2.0), which corresponds to the 95 per cent confidence level;

p = the proportion in the target population estimated to have a particular characteristic. If there is no reasonable estimate, then 50 percent (.50) is used;

q = 1.0 - p;

d = *degree of accuracy desired, set at 0.05*

In this study, the conservative value of 0.50was taken as the proportion of rural poor people covered with government antenatal care services.

The 'z' statistics is 1.96. Accuracy level is put at 0.05 level.

The sample size was then calculated as:

$$n = \{(1.96^2)(0.50)(0.50)\}/(0.05^2)$$
$$= 384$$

Non-response rate is set at 15 %; so,
Required sample size adjusted for non-response rate $= (1/1-0.15) \times 384 = 451 \approx 450$

Sampling method

Study population of interest was identified as follows:

- systematic selection of 50 villages ("clusters") from the RHC area made using Probability Proportional to Size;
- random selection of three starting points ("households") within three different sections of each cluster; and
- within each section 3 households meeting the criteria set for study population were selected and interview performed using a structured questionnaire.

Selection began in the starting household and then continued to the next households until 3 eligible households were obtained in each section. This gave a total of 9 households for each cluster. Finally a total sample of 450 was achieved.

Data collection

Five data collectors interviewed 450 mothers in 10 days, using pretested structured questionnaire.

Data entry and analysis

All data collected were entered into a portable computer using EPIINFO version 6.04. Validity and consistency checks were made before performing analytical procedures.

Duration

The quantitative study took three and half weeks: one week for preparation, one and half week for data collection, and one week for data analysis and report writing.

RESULTS

During two years prior to the survey, 450 infants were born alive to the study mothers currently residing in Sann-Ywa RHC area. Of these live births, 12 were dead and 438 were still alive. The mothers of the 450 infants ranged in age from 17 years to 46 years with the median age of 28 years. The majority of the respondents were the mothers themselves (91.6%), other respondents included a relative (6.2%), the father (2.0%) and an unrelated person (0.2%).

The sex and age of death of the 12 live births who had died during 2 years prior to the time of interview are indicated in Table 1.

Table 1. Age at death and sex of 12 dead children born during the prior two years, sampled in Sann-Ywa RHC survey area, Taik-kyi township, June, 1999.

Sex	Age at death in years		
	<1	1-2	Total
	No. (%)	No. (%)	No. (%)
Male	7 (88%)	1 (12%)	8 (100%)
Female	3 (75%)	1 (25%)	4 (100%)
Total	10 (83.3%)	2 (16.7%)	12 (100%)

The 10 deaths during the first year of life among 450 births represent an infant mortality rate of 22 deaths per 1,000 live births. One needs to note that this rate is based on a sample rather than on a total count of deaths and births. A correction factor was therefore applied in the calculations so as to estimate age-specific mortality risk [6]. The survey's estimate of the corrected cumulative risk of death at the end of the first year of life is 43 infant

deaths per 1,000 live births for the Sann-Ywa RHC area of Taikkyi Township.

Antenatal care providers

Types of persons who provided antenatal care to the mothers of 450 births are shown in Table 2.

Table 2. Persons who provided antenatal care to the mothers of 450 births sampled in Sann-Ywa RHC area, Taikkyi Township, June, 1999.

Type of antenatal care provider	Number of pregnant mothers	Per cent of 450 births
Contacted nobody	118	26.2%
Untrained Traditional Birth Attendant (TBA)	73	16.2%
Trained TBA	32	7.1%
Auxiliary Midwife	41	9.1%
Midwife or Lady Health Visitor	210	46.7%
Hospital Staff or Medical Officer	9	2.0%
Others	11	2.4%

In the survey area, pregnant mothers might contact more than one antenatal care provider. The "others" category included quacks or other persons who were not trained for antenatal care. Table 2 shows that only 47% of pregnant mothers contacted local health center staff, i.e., five midwives working at different villages (sub-centers) in the jurisdiction of Sann-Ywa RHC. Since certain essential antenatal care services like blood pressure measurement and provision of iron tablets are the services that the local health center staff (midwives) are supposed to provide, it can be assumed that only about half of the pregnant mothers were likely to receive these essential services.

Antenatal care received

Out of 210 pregnant mothers who contacted the midwives, 140 (67%) did so at or before 5 months of pregnancy. Out of 210 pregnant mothers who contacted the midwives, 121 (58%) did so three times or more.

Table 3 shows the services the mothers received during antenatal visits to midwives.

Table 3. Services received by those mothers who contacted local midwives, Sann-Ywa RHC area, Taikkyi Township, June, 1999.

Services received	No (%) (Total=210 mothers)	95% Confidence interval
Abdomen examined	168 (80%)	75% - 85%
Blood pressure measured	122 (58%)	51% - 65%
Iron tablets received	65 (31%)	27% - 35%

Attendant at birth

Table 4 shows the person who mainly attended the 450 births during two years prior to the survey.

Table 4. Main person who attended the 450 births, Sann-Ywa RHC area, Taikkyi Township.

Types of birth attendants	Number (%)
Trained	172 (38.2%)
- Trained Traditional Birth Attendant	65 (14.4%)
- Auxiliary Midwife	41 (9.1%)
- Midwife or Lady Health Visitor	51 (11.3%)
- Hospital Staff or Physician	15 (3.3%)
Untrained	276 (61.3%)
- Untrained Traditional Birth Attendant	267 (59.3%)
- Relative, friend or other untrained person	7 (1.6%)
- Unattended	2 (0.4%)

The Table 4 shows that only about 38% of the deliveries were attended by trained birth attendants.

DISCUSSION

In this study, an attempt was made to develop a monitor tool for health care

utilization by less well-to-do rural mothers in a township in Myanmar.

The monitor tool and its data collection method (i.e., the rapid survey) encompassed the three dimensions of REM frame work advocated by WHO [7]. Firstly, they dealt with issues reflecting health problems (antenatal care components and delivery attendance) rather than overall health care concerns. Secondly, information sources were identified from community. Thirdly, method used to obtain the information was household interviews.

The survey provided information to stimulate local decision-makers for taking action to improve health and health care utilization of less well-to-do rural mothers in their area. The methodology was simple, quick and scientific. This methodology can be used on a moderate-sized sample of respondents in a period of time less than one month with a small assessment team. Further information on other related aspects like health care utilization for children can be obtained by adding some concise set of questions to the questionnaire without incurring much expenses and manpower.

However, the study has some limitations because the following has not been tested yet:

- whether local managers (State/Division or Township level) could use the methodology regularly as a monitor tool by themselves without researchers' (outsiders') involvement; and
- the extent and ways of stimulation that the findings of this kind of study make to local health authorities, higher level health administrators and local people to take on follow-up actions that improve the health utilization status by of less well-to-do rural mothers.

These are considerations for future operational research.

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Non-ulcerative Sexually Transmitted Diseases among married women in selected urban and semi-urban area (aetiological aspects)

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The study population comprised of 269 and 464 cases of non-ulcerative females (>20-50 years) from Ahlone and Thaketa townships respectively. In Ahlone area, different pathogens were isolated from 32 cases (11.20%): *Chlamydia trachomatis* (1.12%), *Candida albicans* (2.23%), *Trichomonas vaginalis* (7.06%), *Neisseria gonorrhoeae* (0.74%) and mixed infection (*C. albicans* + *T. vaginalis*) (0.74%). In Thaketa, 69 cases (14.87%) were infected: *C. trachomatis* (1.94%), *C. albicans* (1.72%), *T. vaginalis* (7.54%), *N. gonorrhoea* (2.16%) and mixed infection (*N. gonorrhoeae* +*T. vaginalis* 0.86%; *C. trachomatis* + *T. vaginalis* 0.65%). Antibiotic susceptibility activity of *N. gonorrhoeae* from Ahlone area revealed that one strain was resistant to all antibiotics tested and another strain was resistant to penicillin, erythromycin, tetracycline, however, it was sensitive to spectinomycin, sparfloxacin, kanamycin, cefaclor, ceftriaxone and netilmicin. Fourteen strains of *N. gonorrhoeae* isolated from Thaketa area were resistant to amikacin (71.43 %), carbenicillin (50%), erythromycin (78.57%), kanamycin (71.43%), penicillin (92.86%), rifampicin (57.14%), septrin (85.71%), spectinomycin (14.28%), and vancomycin (42.85%). The plasmid 25.2 MDa was obtained from *N. gonorrhoeae* when tested by agarose gel electrophoresis.

INTRODUCTION

Sexually transmitted diseases have recently been regarded as serious health problems in developing countries as well as in Myanmar. They have been ranked as the sixth priority health problem out of 39 in Myanmar (1996-2001) [1]. Gynaecological morbidity associated with STDs is thought to be high among women and pelvic inflammatory disease (PID), one consequence of STD infection, may lead to infertility [2]. According to WHO, in women aged 44 years, reproductive ill-health account for 33 percent of the total disease burden as compared to 12.3% for males of the same age [3]. In order to improve care for women with STDs, this field study was carried out to identify the level of asymptomatic, unrecognised or untreated infection in women.

MATERIALS AND METHODS

Study area and study population

The study was carried out from February 2002 to March 2004. It was a cross-sectional community-based study. The study population was on non-ulcerative married women from Ahlone and Thaketa townships, Yangon Division during the study period. It comprised of 269 and 464 cases from Ahlone and Thaketa townships respectively with their ages ranged between >20-50 years. A set of questionnaire was administerd to all cases tested which covered the gynaecological history including menstruation, symptoms of genital and urinary tract infection and obstetric, medical and surgical histories.

The medical officers examined the vulva for ulcerative lesions and vaginal discharge with disposable speculum. The cervix was inspected for ulcers, warts, ectopy and cervicitis. Two high vaginal swabs were taken, one was inoculated into *Trichomonas* media, a second into sterile saline for wet mounting and gram staining for Candidiasis. After the ectocervix had been cleaned out of secretions, three Dacron-coated swabs were placed in the cervical and rotated to collect endocervical secretions and cells. These were placed in Amies transport medium for gram staining and culture of *N. gonorrhoea*; *E. coli* and *S. aureus*; second swab in sterile normal saline for PCR; and the third in the transport media for antigen detection of *C. trachomatis* by Clearview kit (Unipath). All the specimens were transported to the laboratory within 2-4 hours and processing of specimens was carried out within 24 hours.

Laboratory diagnosis of Sexually Transmitted Diseases

The isolation and identification of the sexually transmitted pathogens was carried out as the method described by Dyck, Meheus & Piot, 1999 [4]. The isolation and identification of bacterial pathogens was carried out by gram-staining, biochemical tests and serology. *Candida albicans* was confirmed by germ tube test. *Neisseria gonorrhoea* was tested by oxidase and Phardebact monoclonal lab test. The active form of trophozoite of *T. vaginalis* was identified in Trichomonas media up to seven days. The molecular assay of plasmid analysis on *Neisseria gonorrhoea* was assayed by the method of Sambrook, 1982 [5].

Antibiotic susceptibility testing

It was carried out as described by WHO, 1996 [6]. The discs were purchased from BBL, USA or Hi, India: Erythromycin (E-15), Carbenicillin (Car-100), Kanamycin (K-30), Penicillin (P-2), Rifampicin (RF-30), Amikacin (An-30), Septrin (trimethoprim + sulfamethoxazole) (SXT), Tetracycline (Te-30) Vancomycin (VA-30), Spectinomycin (SN-10) and Netilimicin (NET-30); Ceftriazone (Ci-30) and Cefclor (Cj- 30).

RESULTS

Distribution of sexually transmitted pathogens such as *C. trachomatis*, *N. gonorrhoeae*, *C. albicans* and *T. vaginalis* from Ahlone and Thaketa Township is shown in Table 1 & 2.

From Ahlone *C. albicans* and *T. vaginalis* was found in 2 cases (0.74%) as mixed infection. Moreover, from Thaketa, *N. gonorrhoeae* and *T. vaginalis* was found in 4 cases (0.84%) as mixed infection. It was determined that 32/269 cases (11.90%) from Ahlone and 67/477 cases (14.05%) from Thaketa were isolated with these 4 pathogens, and seems that women from Thaketa were contracted more than Ahlone area ($p<0.01$).

As for other bacterial infection, *E. coli* and *S. aureus* were isolated from both areas.

Table 1. Distribution of pathogens isolated different age groups from Ahlone Township

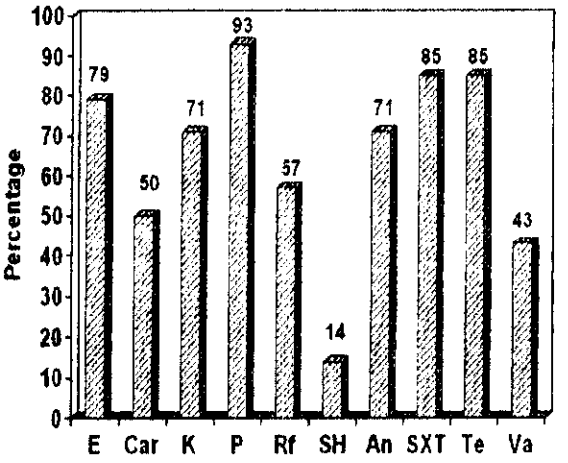
Age group yrs	Tested	*Chlamydia trachomatis*	*Candida albicans*	*Trichomonas vaginalis*	*Neisseria gonnorhoeae*	*C. albicans + T. vaginalis*	Total
>20-25	26	1 (3.85)	1 (3.85)	2 (7.69)	0	0	4 (15.38)
>25-30	37	1 (2.70)	0	4 (10.81)	0	0	5 (13.51)
>30-35	67	0	4 (5.97)	1 (1.49)	2 (2.99)	0	7 (10.45)
>35-40	47	0	0	3 (6.38)	0	0	3 (6.38)
>40-45	54	1 (1.85)	1 (1.85)	6 (11.11)	0	2 (3.70)	10 (18.52)
>45-50	38	0	0	3 (7.89)	0	0	3 (7.90)
Total	269	3 (11.11)	6 (2.23)	19 (7.06)	2 (0.74)	2 (0.74)	32 (11.90)

Figures in parenthesis denote percentages

Table 2. Distribution of pathogens isolated from different age groups from Thaketa Township

Age groups yrs	Tested	*C. tracho matis*	*C. albi cans*	*T. vagi-nalis*	*N. gonorhoeae*	*N. gon. + T. vag*	*C. tra + T. vag.*	Total
>20-25	36	1 (2.78)	1 (2.78)	3 (8.33)	0	1 (2.78)	0	6 (16.67)
>25-30	67	0	2 (2.98)	8 (11.94)	0	0	0	10 (14.93)
>30-35	119	4 (3.36)	2 (1.68)	5 (4.20)	2 (1.68)	2 (1.68)	1 (0.84)	16 (13.45)
>35-40	108	2 (1.85)	1 (0.93)	9 (8.33)	8 (7.41)	1 (0.93)	1 (0.93)	19 (17.59)
>40-45	84	2 (2.38)	2 (2.38)	4 (4.76)	4 (4.76)	0	0	12 (14.26)
>45-50	50	0	0	5 (10.00)	1 (2.00)	0	1	7 (14.00)
Total	464	9 (1.94)	8 (1.72)	35 (7.54)	10 (2.16)	4 (0.86)	3 (0.65)	69 (14.87)

Figures in parenthesis denote percentages



E_{15}= Erythromycin
An_{10}=Amikacin
Car_{100}=Carbenicillin
SXT=septrin
K_{30}=Kanamycin
P_2=Penicillin
Te_{30}=Tetracycline
Rf_5=rifampicin
Va_{30}=Vancomycin
SH_{10}=Spectinomycin

Fig. 1. Resistant pattern of different antibiotics when tested on *Neisseria gonorrhoeae* isolated from nonulcerative women with STD (n=14) 2 cases from Ahlone and the rest from Thaketa

It was found that *E. coli* was isolated from 4.46% and 6.03% from Ahlone and Thaketa respectively. So also *S. aureus* was isolated from 0.37% and 0.64% from Ahlone and Thaketa respectively. (Table 3 & 4).

Antibiotic susceptibility pattern of *Neisseria gonorrhoea* is shown in Fig. 1.

Table 3. *Escherichia coli, Staphylococcus aureus* isolation and clue cells from non-ulcerative women from Ahlone area (n=269)

Age groups (yrs)	clue cells <5	clue cells 5>20	Total	*E. coli*	*S. aureus*
>20-25	3	2	5	2	0
>25-30	3	2	5	2	0
>30-35	6	9	15	2	1
>35-40	6	3	9	3	0
>40-45	4	4	8	1	0
>45-50	2	2	4	2	0
Total	24 (8.92)	22 (8.18)	46 (17.10)	12 (4.46)	1 (0.37)

Figures in parenthesis denote percentages

The resistance pattern was found in erythromycin (78.6%), carbenicillin (50%), kanamycin (71.4%), penicillin (92.9%), rifampicin (57.1%), spectinomycin (14.0%), amikacin (71.4%), septrin (85.7%), tetracycline (85.7%) and vancomycin (50%). However, they were sensitive to cefaclor and ceftriaxone.

Table 4. *Escherichia coli, Staphylococcus aureus* isolation and clue cells from non-ulcerative women from Thaketa area (n=464)

Age groups (yrs)	clue cells <5	clue cells 5 > 20	Total	*E. coli*	*S. aureus*
>20-25	2	1	3	1	1
>25-30	5	5	10	6	1
>30-35	13	6	19	9	1
>35-40	4	8	12	4	0
>40-45	6	13	19	4	0
>45-50	4	6	10	4	0
Total	34 (7.33)	39 (8.41)	73 (15.73)	28 (6.03)	3 (0.64)

Figures in parenthesis denote percentages

DISCUSSION

Neisseria gonorrhoea, is a reservoir in human genital tract and therefore, transmission is caused by sexual intercourse. In men, symptoms will develop two to five days following infection with the mean incubation period of 8.3 days. For women, the average incubation period is about 10 days. The most common complaints for men are urethral discharge and painful urination (dysuria). However, 5-10% of infected men will be asymptomatic. For women, increased vaginal or cervical discharge is the most frequently reported symptom. The other complaints are burning sensation or itching, bleeding during and after intercourse, and fowl smelly discharge, 30-60% of infected women will be asymptomatic or subclinical [7].

Antimicrobial agents against *Neisseria gonorrhoea* in western region of the Kingdom of Saudi Arabia [8]; Kenya [9]; Kigali, Rwanda (1985-1993) [10]; India [11]; Thailand [12]; and Phillipines [13]

claimed the increasing resistance pattern to antimicrobial agents.

The bacterial vaginosis in pelvic inflammatory disease of sexually active young women, may give the sequelae, such as tubal-factor infertility and ectopic pregnancy [14]. The relationship of vaginal trichomoniasis and pelvic inflammatory disease among women colonized with *C. trachomatis* revealed the evidence of upper genital tract disease [15]. The risk factors for infection in women in Manitoba, Canada demonstrated that differences in the demographic and socioeconomic characteristics of women with gonorrhoea, chlamydia and coinfection suggest the existance of multiple reservoirs of infection in their study population [16]. After studying the prevalence of *C. trachomatis* urogenital infection, in pregnant women in Martinique, the authors stated that none of the behavioral, demographic and clinical factors associated with chlamydial infection was sensitive enough to permit efficient selective screening. It was cost effective to recommend a routine screening for chlamydial infection together with an educational programme [17]. The cost effective analysis of screening and treatment for *C. trachomatis* infection in asymptomatic subjects showed that treatment with a single dose of azithromycin under supervision in the clinic was the most cost-effective intervention strategy [18].

Sensitivities of PCR, MicroTrak, Chlamydia EIA, IDEIA and PACE 2 for purified *C. trachomatis* elementary bodies in urine, peripheral blood leukocytes and synovial fluid was reported [19]. In detection of *C. trachomatis* when compared between a commercial and in house amplification methods and culture demonstrated that the in house PCR had the highest sensitivity [20]. It was reported that STD awareness and case management improved considerably after approaching various activities in Haiti [21].

From various studies it had been shown that the success of a control programme is evidenced when a reduction of the STD prevalence or when the impact of improved syndrome-based STD case management. In this study candidiasis and trichomoniasis were expected to be more common in view of the poor socioeconomic background of the women and the unsatisfactory housing conditions under which they lived. Thus, personal hygiene is always essential for the control of infections and health education on STDs is always needed.

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Prevalence of acute respiratory tract infections and its risk factors in under-five children

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This study was undertaken to determine the prevalence and risk factors of Acute Respiratory Infections (ARI) among under-five children in a peri-urban community. A cross-sectional community-based study was conducted in North Okkalapa Township during July 2003. Thirty out of the total of 669 children had ARI episodes during the study period. The prevalence of ARI in the community was 5.2 %. Risk factor analyses were carried out using a univariate analysis and the association between exposures and outcomes was expressed as an odds ratio (OR) with its 95% confidence interval (CI). Risk factors for Acute Respiratory Infections included the practice of driving out mosquitoes by smoke (OR= 5.41, 95% CI= 1.08-27.07). Children aged between 6 months to 2 years had the greatest risk compared to less than 6 months although the result did not reach the statistical significance (OR= 3.60, 95% CI= 0.81-15.92). Immunisation was found to have a protective effect as indicated by lower odds of BCG vaccination (OR=0.26, 95% CI= 0.09-0.72), complete DPT vaccination (OR=0.13, 95% CI= 0.04-0.44) and completion of all immunisation (OR=0.16, 95% CI= 0.01-0.29).

INTRODUCTION

Acute Respiratory Infections (ARI) are a worldwide problem from which millions of children die annually, and literally billions suffer acute and chronic morbidity arising from their effect [1]. They are responsible every year for the deaths of 4.3 million children under five years of age that represents 21.3% of all deaths in this age group [2].

Studies in various parts of the world also show that on average, young children under five years of age suffer 4 to 6 episodes of Acute Respiratory Infections per year and that one-third to a half of the outpatient paediatric consultations in developing countries are due to ARI [3, 4, 5].

The incidence of ARI has been reported to be as much as fifty times higher in developing countries than in developed countries. One possible explanation for this discrepancy is that it is due to socio-economic status [1, 2].

In spite of the high incidence of Acute Respiratory Infections, there is very little information on the risk factors for these infections. The main objective of this study was to determine the prevalence and associated risk factors of Acute Respiratory Infections in under five years of age in North Okkalapa Township. Knowledge of the factors related to acquisition of ARI will help in its prevention and control.

MATERIALS AND METHODS

Study area and population

A community-based cross-sectional survey was carried out in North Okkalapa Township, a peri-urban township of Yangon during July 2002. Two wards from this township with same socio-economic status were selected. The study population consisted of every household with at least one under five children and a total of 669 households (669 children) were recruited for the study.

Methodology

Before the field survey, series of training were given to interviewers for field data collection. After having informed consent data was collected by face to face interview using standard pre-tested structured questionnaire to obtain socio-demographic characteristics and risk factors for ARI. Prevalence of ARI was accessed by asking the mothers or guardians if they had been ill with cough accompanied by short, rapid breathing among other signs of ARI in the last 2 weeks. Upper Respiratory Infection (URI) was defined to include any combination of the following symptoms: cough with or without fever, blocked or running nose, sore throat, and/or ear discharge. Acute Lower Respiratory Infection (ALRI) included any of the above symptoms of URI with the addition of rapid breathing and/or chest indrawing and/or strider [6].

Statistical methods

Each risk factor was analysed separately in a univariate model. The association between exposures and outcomes was expressed as an odds ratio (OR) with its 95% confidence interval (CI). P<0.05 was used as the definition of statistical significance.

Ethical Consideration

This study was approved by the Medical Ethics Committee of the Department of Medical Research.

RESULTS

Table 1. Socio-demographic characteristics as risk factors for ARI

Risk factors	ARI prevalence	Odds ratio	95% CI	p-value
Age				
0-5 months	2.35%	1		
6-23 months	8.00%	3.61	0.82-15.93	0.06
24-60 months	3.89%	1.68	0.37-7.61	0.49
Sex				
- Male	5.4%	1		
- Female	5.1%	0.95	0.48-1.87	0.88
Mother's education				
- Illiterate	0.0%	Infinite		
- Literate but less than high school	5.58%	1		
- High school and above	5.19%	0.92	0.46-1.85	0.83
Father's occupation				
- Retired	5.8%	1.98		
- Non-government employed	6.38%	2.18	0.59-6.64	0.27
- Government employed	2.7%	1	0.42-11.24	0.35
Mother's occupation				
- Dependent	4.9%	1.84	0.24-13.97	0.55
- Non-government employed	8.1%	3.18	0.38-25.96	0.28
- Government employed	3.03%	1		
Family income (Kyats per month)				
- ≤10,000	7.04%	1.73	0.68-4.36	0.23
- 11000-20000	4.59%	1.10	0.42-2.81	0.84
- ≥21000	4.19%	1		

Study population

A total of 669 children were enrolled. Their mean age was 24± 15.24 months. Sex distribution was almost equal (Male 50.2% and female 49.8%). The median household was a family of seven persons (interquartile range, 5-9). Median number of rooms per household was two (interquartile range, 2-3). Majority (65.3%) of children lived in the house built with timber, while 20.6% lived in bamboo and 12.3% in brick house.

Table 2. Housing and crowding parameters as risk factors for ARI

Risk factors	ARI prevalence	Odds ratio	95% CI	p-value
Type of house				
- Bamboo	8.00%	1		
- Timber/brick	4.50%	0.55	0.26-1.15	0.11
Cooking place				
- In the living room	6.4%	1.33	0.52-3.41	0.61
- Kitchen	5.2%	1.07	0.51-2.3	0.83
- Outside the house	4.8%	1		
Frequency of cooking				
- 1-2	7.8%	1		
- >2	12.5%	1.69	0.19-14.67	0.06
Pets at home				
- No	5.1%	1		
- Yes	5.6%	1.11	0.51-2.41	0.79
Work place at home				
- No	5.1%	1		
- Yes	5.3%	1.04	0.36-3.03	0.94
Number of room				
Single	6.57%	2.13	0.77-5.89	0.13
- Two	5.04%	1.61	0.55-4.68	0.37
- Three or more	3.18%	1		
Total household member				
- 1-3	5.45%	1		
- 4-5	4.39%	0.79	0.20-3.12	0.74
- 6-9	3.89%	0.70	0.18-2.60	0.59
- ≥10	8.72%	1.66	0.45-6.08	0.44
Persons sharing a bed				
- 1-2	2.22%	1		
- 3-4	5.51%	2.56	0.60-10.97	0.18
- ≥5	8.57%	4.12	0.64-26.54	0.10

Nearly 44% of households cooked inside their houses and 16.4% cooked outside. Only 40.4% had a kitchen. Majority of household (83 %) used wooden coal as a cooking fuel and 68% used to cook two times a day.

There were smokers in 64.13% of the households with median number of two smokers in each household. Most (80%) of the children were taken care at their home. Only 20% attended day care centres. Nearly 90% of children completed all relevant immunisation. Regarding the feeding practices, 95% of children were exclusively or partially breast fed.

Table 3. Factors enhancing indoor air pollution as risk factors for ARI

Risk factors	ARI prevalence	Odds ratio	95% CI	p-value
Passive smoking				
- No smoker				
- One or more smoker	4.2%	1		
	5.8%	1.42	0.67-3.02	0.36
*Type of material for setting fire**				
- Less	4.4%	1		
- Moderate	5.6%	1.28	0.53-3.09	0.72
- Heavy smoke-forming	5.9%	1.34	0.17-10.63	0.83
*Type of fuel***				
- No smoke forming	4.88%	1		
- Smoke forming	4.80%	1.02	0.25-4.12	0.97
Use of scent stick				
- No	4.70%	1		
- Yes	6.40%	1.37	0.68-2.79	0.38
Use of mosquito coil				
- No	4.50%	1		
- Yes	5.50%	1.21	0.52-2.83	0.44
Practice of driving out mosquitoes by smoke				
- No	4.10%	1		
- Yes	22.2%	5.41	1.08-27.07	0.04

* Less= Turpentine, Moderate= Pieces of wood/ paper , Heavy= Pieces of scent sticks/ rubber/ wax / Coconut skin /Garbage/ disposal/Diesel/ kerosene

** No smoke forming = Electric/ gas, Smoke forming = Wood/ coal/ Kerosene/ Animal excreta

Prevalence of ARI

All of these children had cough, runny nose and fever. Chest indrawing and difficulty in breathing were not seen. Among the enrolled children, 35 had signs and symptoms of Upper Respiratory Tract Infections, yielding an ARI prevalence of 5.2% in this study.

Risk factor analyses

Tables 1, 2, 3 and 4 present the results of the univariate risk factor analyses.

Children aged between 6 months to 2 years had the greatest risk of ARI compared to those less than 6 months (OR = 3.60, 95% CI = 0.81- 15.92). But the result failed to reach the statistical significance (Table 1).

Practice of driving out mosquitoes by smoke had significant association with increased risk of ARI (OR = 5.41, 95% CI = 1.08-27.07) (Table 3). Immunization had protective effect as shown by the lower odds of BCG vaccination (OR = 0.26, 95% CI = 0.09-0.72), complete DPT vaccination (OR = 0.13, 95% CI = 0.04-0.44) and completion of all immunization (OR = 0.16, 95% CI = 0.01- 0.29) (Table 4).

Table 2 shows the housing and crowding parameters as risk factors. They were not found to have significant association with ARI.

As shown in the tables 1-4 other variables such as socioeconomic characteristics, smoking, childcare and breast-feeding were also tested but not found to be significant.

Table 4. Immunization, child care and breast feeding variables as risk factors for ARI

Risk factors	ARI prevalence	Odds ratio	95% CI	p-value
BCG vaccination				
- No	16.13%	1		
- Yes	4.75%	0.26	0.09- 0.73	0.005
Complete DPT vaccination				
- No	28.57%	1		
- Yes	4.91%	0.13	0.04- 0.44	0.001
Measles vaccination				
- No	11.43%	1		
- Yes	5.36%	0.44	0.14- 1.34	0.14
Complete immunization				
- Not complete	21.58%	1		
- Complete	4.12%	0.16	0.01- 0.29	0.006
Breast feeding				
- Partial or exclusive	5.0%	1		
- Never	9.10%	1.89	0.55- 6.53	0.31
Use of vitamin A				
- Yes	5.4%	1		
- No	5.1%	0.93	0.47- 1.85	0.83
Attending day-care centre				
- No	5.2%	1		
- Yes	5.2%	1.00	0.42- 2.35	0.97

DISCUSSION

This study revealed that 5.2% of the children under study had ARI. This prevalence of ARI was much lower than other studies in developing countries. Sikolia et al in 2002 [7] reported that ARI prevalence under five years of age in Kenya was 69.7%. But the study subjects in their study were recruited from outpatient clinics and hospitals while our study was community-based. It was also found that ARI prevalence in a rural community of Bangladesh was 58.7% [8]. In this study children were followed once a month for four consecutive months. These facts might account for the higher ARI prevalence in these studies.

Practice of driving out mosquitoes by smoke was a strong risk factor for ARI. Although the fact that this practice of smoke emission contributed to the prevalence of ARI has never been reported, Environmental Tobacco Smoke (ETS) was cited as a risk in some studies [9, 10, 11]. But ETS exposure was found to have no relationship with acquisition of ARI in our study.

It was also revealed that ARI was most prevalent in children aged 6 months to 2 years. Although the result failed to reach the statistical significance, this finding agrees with Anders, Zaman and Aung Thu [9, 12, 13]. The age between 6 and 18 months has indeed been termed the period of vulnerability [14, 15]. Possible mechanisms for this increased risk include degradation of maternal antibodies, immaturity of the adaptive immune system, cessation of breast-feeding and start at childcare centres.

In addition, immunisation was found to be protective against acquisition of ARI in our study. This was indicated by lower odds value of BCG vaccination, complete DPT vaccination and completion of all immunisation. This has supported Broor [16] on inappropriate immunisation for age as a risk factor to ARI prevalence. However, it was in contrast with other studies by Sikolia [7] and Zaman [12] who reported that role of immunisation status was not clear in ARI acquisition.

A study by Aung Thu et al [13] reported that

family income was closely associated with ARI. This result was not reproduced in our current study.

The International Consultation on Control of ARI in 1991 [2] reported that there were links between many environmental risk factors (such as smoke, indoor air pollution, outdoor air pollution, passive smoking, overcrowding) and risk factors in the child (that is low birth weight, malnutrition, measles, breast feeding and vitamin A deficiency) with ARI in developing countries and recommended on more research on these factors. This study revealed that none of the usual socio-economic factors was a significant risk factor but smoke emission to drive out mosquitoes and immunisation status played an important role in acquisition of childhood ARI.

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SHORT REPORT

Assessing of existing Information, Education and Communication (IEC) materials on Dengue Haemorrhagic Fever

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In DHF control measures, health education and community participation are emphasized for source reduction of mosquito breeding, appropriate educational material on mosquito breeding sites and methods of source reduction would be needed [1]. Main control activity in Myanmar is larva control by water changing and water emptying campaign of mass movement routinely, and removal of discarded tin and coconut shells. Roof gutters were also the possible breeding habitat of *Aedes* in Singapore [2]. Information, education and communication (IEC) programme for control activity and awareness to seek treatment at Government Health Institution is also conducted by using mass media, e.g. radio talk, television spots, etc [3]. IEC materials regarding DHF have been developed in Myanmar for many years. Health messages were spread through various media, such as radio, television, newspapers and local journals. However, printed media regarding DHF is not sufficiently distributed. Pamphlets were developed locally in States and Divisions. Social mobilization plays an important role for sustaining of larva control activities in the community aiming at promoting the coordination, collaboration and cooperation between concerned departments, NGOs and community involvement [4]. A qualitative study was conducted in Thaketa Township, DHF hyperendemic area in Yangon Division. General objective was to develop the draft of IEC materials (pamphlets, radio, television, newspapers, and journals). Specific objectives were to find out the recommendation of existing IEC materials, to pretest the draft and to assess the social mobilization process of midwives in the community. Ten Focus Group Discussions (FGDs) were conducted among basic health staff, general practitioners, NGOs and volunteers.

The findings consisted of three components.

(i) FGD on recommendation of existing IEC materials.
(ii) Pretesting of draft on pamphlets, television spot, radio talk, newspapers and journals.
(iii) FGD on social mobilization in the community.

(i) FGD on recommendation of existing IEC

The followings were the suggestions made by the majority of participants.

> *Pamphlets* should be Illustrated in cartoon with short and clear messages. These should be well distributed among the community especially in schools. Same message (6 inches x 4 inches size) could be used in *newspapers* and *journals* once a week before and during rainy season. Health magazines and astrology magazines were the most preferable media. Page number 2 or 3 was the most conspicuous position. The information should be telecast between 7 pm to 8 pm within soap opera hours, twice a week during rainy season. It

would be better in presenting three spots: cause, signs and symptoms, preventive and control measures. The suitable time for 10-minute *radio* talk was between 5 pm to 6 pm. Interview of the mother by DHF project manager and paediatrician was very exciting and should be included in *television* as well as *radio* programme. Among the mentioned IEC materials, preventive and control measures were found to be the most interesting facts by the community. Regular clearing of the gutter should be mentioned in health message as well as in the book "Facts for life". The fact that "DHF may attack second time in previously infected child" was important to remind the mothers. Cartoon and art competition and exhibition on DHF would be the most effective media for school children and mothers.

(ii) Pretesting of draft on pamphlets, television spot, message for radio talk, newspapers and journals

It was done and some points were transformed according to the comments of the participants. The respondents demand for further improvement of existing IEC according to FGD findings. It needs to improve the style, way of presenting messages, consistency, preferred time and competitions. The existing print media should be reviewed and revised by the efforts of Vector Borne Disease Control Programme (VBDC) and Health Education Bureau.

(iii) FGD on social mobilization in the community

There's a great need of sustainability of larva control activities through community involvement. Midwives were the key persons coordinating with the ward authorities, Maternal and Child Welfare Association (MCWA) members and other NGOs. They usually follow the instruction of Township Medical Officer (TMO) for DHF health education and demonstrating larva control activities, integrating with immunization. They made contact with the Ward authorities one day prior to the field visit. Emergency household visit was provided by the respective midwife when a suspected DHF case was observed in the ward. The relevant points were note taken in the diary and reported weekly to Division Health Office and Township Law and Order Restoration Council through checklist. They suggested to organize a health committee in each ward for effective motivation in their society. Larva control measures must be regularly done not only in the households but also in the schools and monastery. It is necessary to change the wrong belief that polluted water is a breeding source of *Aedes aegypti*. They also pointed out that rules and regulations were also needed for sustainability of larva control activities. Midwives and volunteers performed larva control measures in the households where the household members did not regularly do.

In Myanmar, roof gutters were not well known breeding sites among the public. These should be added to the existing IEC materials. Moreover, further entomology studies related to roof gutters should be carried out in the places where main water supply was pipe water. The reason was that roof gutters were regularly cleared in the houses where rainwater was mainly used during the rainy season. IEC materials should clearly focus on behavioural messages for source reduction. Qualitative studies to assess acceptability of IEC materials and barriers to community use should be continued.

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