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No. 4

A QUARTERLY
DEVOTED TO HYGIENE, PREVENTIVE MEDICINE,
MEDICAL SCIENCE AND ALLIED SUBJECTS



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The Institute of Hygiene & Preventive Medicine
6, BIRDWOOD ROAD, LAHORE

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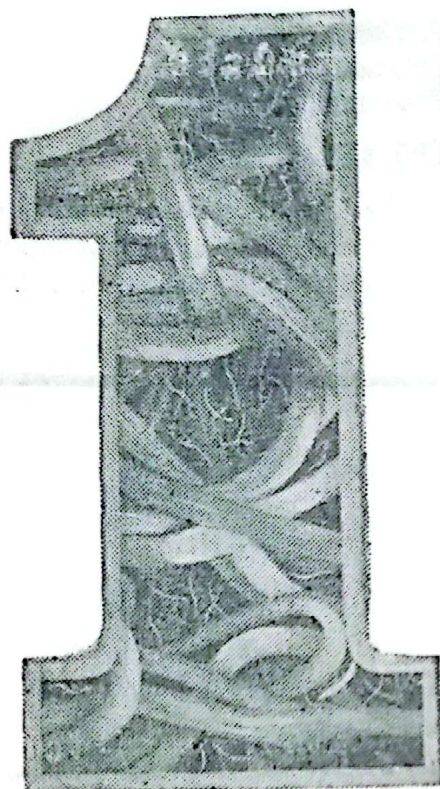
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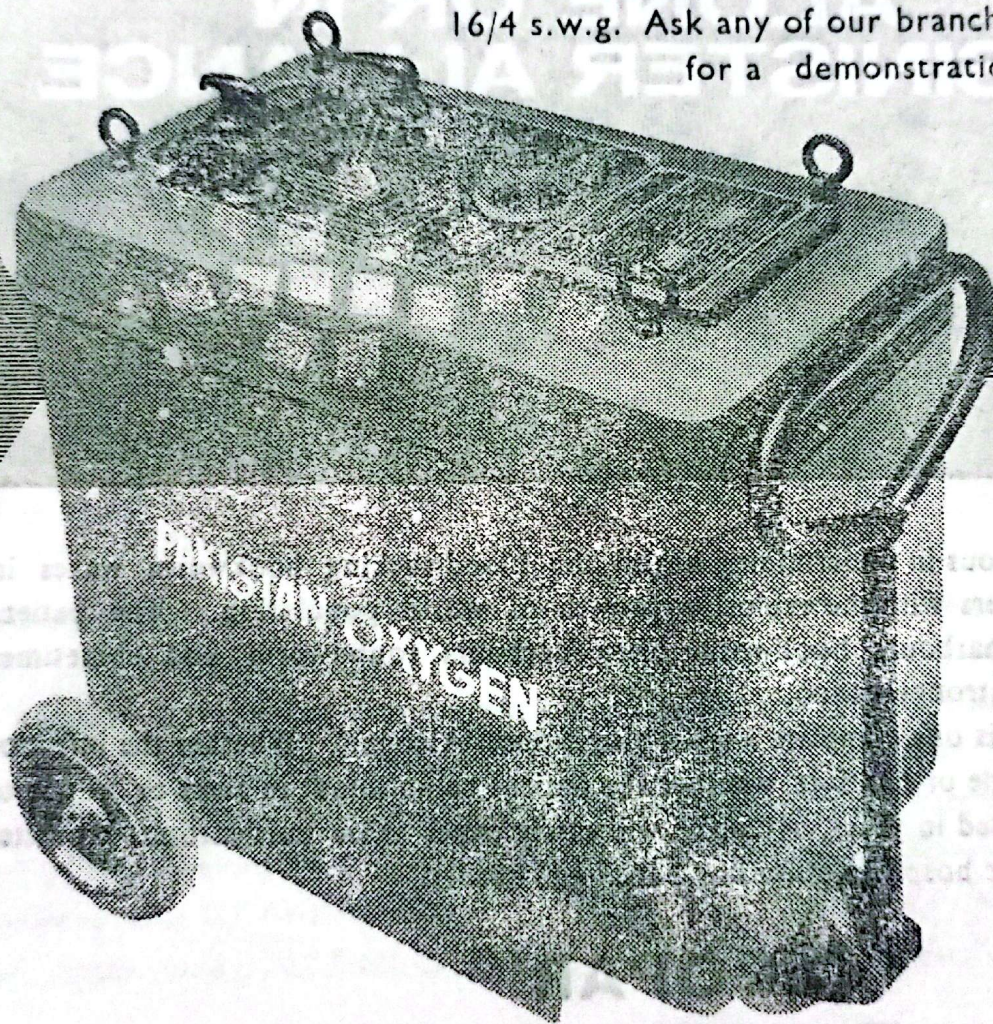


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KEYFUS

ASSESSMENT OF NUTRITIONAL STATUS OF PAKISTANI INDUSTRIAL WORKERS

PART II

Anthropometric Measurements

BY

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Importance of nutrition as a community health problem is well established. Living clean, using drugs for curing diseases and vaccines for immunisation is not an adequate way of maintaining good health. That diseases, such as night blindness, scurvy, beri beri and rickets, had their origin in diet was well recognized even in the ancient days. The English Physician Lind¹, regarded as the father of modern naval hygiene, published a treatise on scurvy as early as 1753, which clearly demonstrated the nutritional origin of this disease.

Nutritional status of populations cannot be established by the observations of nutritionally inexperienced persons. The fact that a cheering throng stands along the street as the liberators march in is no proof that the nutrition of the entire populace is adequate. Nor can one assess nutritional status, by what one can observe in driving along the streets. The assessment of nutritional status requires careful and detailed examination of many people by trained personnel. This constitutes Nutritional Survey. The methods available for Nutritional Survey fall into five categories : Vital Statistics, Food Intake, Anthropometric, Clinical Examination, and Laboratory tests².

Anthropometric—Measurement of body weight and height as related to sex and age offer the most objective and probably the most direct measure of nutritional inadequacy. Such measurements can be obtained quickly and expressed quantitatively². The result of anthropometric nutrition survey is best expressed in relation to local standards. If, as is often the case, local standards are not available, it is justifiable for comparative purposes to use a widely recognized standard³.

The importance of measuring the body composition in relation to problems of nutrition is now becoming apparent⁴. While direct anatomical and chemical methods

of analysing body composition are fundamental, other methods must be used in the study of living persons. Indirect methods for establishing leanness-fatness include anthropometric measurements. These include measurement of subcutaneous fat from skinfold and Roentgenograms, measurement of body density and total body water, and fat soluble indicators. Of these the most direct, simple and accurate is the measurement of subcutaneous fat from skinfold thickness measured by constant tension calipers⁵. This procedure is similar to the physician's time-honored pinching of patient's skin between thumb and fore-finger to evaluate "nutritional status."

The tendency towards increased fat deposition with age and changes in the distribution of subcutaneous fat are well known^{6,7}. In general the peaks of fatness are in early childhood and in late maturity. The thickness of subcutaneous fat shows a rise in infancy, a decrement in childhood, and another rise in adolescence. Maturity is reached by the third decade of life when termination of skeletal growth and an abrupt end of increment in "operational tissue" often marks the beginning of fat accumulation and progressive changes in the surface contours of the body⁷. While adult fat may be partly due to developmental factor and decrease in energy expenditure, current opinion stresses the nutritional aspect^{8,9}.

In a Canadian survey of 22,000 persons for the measurement of skinfold thickness the triceps was selected as the best single measurement¹⁰. This site was also used in the London Council Survey of School Children, together with the subscapular¹¹. The Committee on Nutritional Anthropometry of the National Research Council (U.S.) recommends both the triceps and subscapular sites for general survey use¹¹.

The following table adapted from Skerlj and Brozek¹² gives mean Arm—kinfold thickness in normal men and women in m.m.

Sex	Young		Middle Aged	
	Men	Women	Men	Women
Age Range	23—29	18—30	53—57	46—67
Mean Age	25.2	24.0	54.8	55.4
Sample	25	31	34	28
Skinfold Thickness	13.7	21.9	15.4	26.3

Some nutritional surveys have since been conducted in Pakistan. Nutritional Survey of the Armed Forces was conducted from January 25 to April, 1956, in collabora-

tion with the U.S. Nutritional Survey Team¹³. Another survey of the civilian population of East Pakistan was concluded in 1964, and Nutrition Survey of the civilian population of West Pakistan is in progress.

A survey based on anthropometric measurements (also clinical examination, 16) of the workers employed in the famous Wagah Sector, east of the city of Lahore, was conducted during August, 1965, immediately before the start of hostilities. The survey was conducted in six industrial concerns. The number of workers on roll in these factories varied from 50 to 4,000.

In planning the survey, due consideration was given to sampling. In factories employing upto 200 workers, all the workers present at the time of survey were examined. In case of factories employing large number of workers, random sampling was done.

Age and measurement of height, weight, and skinfold thickness of each worker were recorded. Height was read in inches to the nearest whole inch. Measurements were taken with the worker standing fully erect.

Weight determinations were made with a portable weighing machine, with the worker wearing light summer dress and without shoes. Weight was recorded in pounds to the nearest whole pound.

In the absence of local standards, weights were compared with the Medico-Actuarial tables of the Association of Life Insurance Medical Directors and Actuarial Society of America, as adjusted by the Interdepartmental Committee on Nutrition for National Defence¹⁴.

Measurement of skinfold thickness was made with Lange Skinfold Callipers to the nearest millimeter. The back of the upper arm (over the tricep), at the level midway between the tip of the acromioclavicular process of the scapula and the tip of the elbow in 90° flexion was preferred for this observation¹⁵.

Monthly family income in rupees, and number, age and sex of family members of each worker, were also recorded. Results of the various observations are given in the following tables :—

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TABLE I
SHOWING NUMBER OF PAKISTANI INDUSTRIAL WORKERS IN DIFFERENT PERCENTAGE
OF STANDARD WEIGHT GROUPS

% of Standard Weight		60-69		70-79		80-89		90-99		100+	
FACTORY	Total No.	No.	% of Mean SD. Total	No.	% of Mean SD. Total	No.	% of Mean SD. Total	No.	% of Mean SD. Total	No.	% of Mean SD. Total
A											
Pakistan Oxygen, Ltd.	47	3	6.4	16	34.0	15	32.0	9	19.2	4	8.4
B											
Electric Equipment Manufacturing Co., Ltd.	88	7	8.0	31	35.2	37	42.0	11	12.5	2	2.3
C											
Malik Mohd Din & Sons Steel Rolling Mills.	145	6	4.1	49	33.9	57	39.3	27	18.6	6	4.1
D											
Kaycee Industries Ltd. Electric Fans Manufacturers	132	8	6.0	57	43.2	56	42.5	9	6.8	2	1.5
E											
West Pakistan Textile Mills Ltd.	200	10	5.0	68	34.0	97	48.5	22	11.0	3	1.5
F											
Bata Shoe Co., Ltd.	396	27	6.8	123	31.0	153	38.8	63	15.9	30	7.6
Total	1003	61		344		415		141		47	

TABLE II

**MEAN SKINFOLD THICKNESS, HEIGHT, WEIGHT AND PERCENTAGE OF STANDARD WEIGHT
OF PAKISTANI INDUSTRIAL WORKERS**

Industrial Concern	Age range (years)	No. of persons examined		Skinfold Thickness (m.m.)		Height (Inches)		Weight (Pounds)		Percentage of Standard Weight	
		Sample	% of Total	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
A											
Pakistan Oxygen, Ltd.	16-19	...	...	...	...	...	...	...	...	...	...
	20-29	14	29.8	7.8	3.7	65.7	2.4	121.0	8.5	83.2	6.0
	30-39	17	36.1	7.0	4.3	66.2	3.5	126.1	22.8	79.7	13.8
	40-49	14	29.8	7.6	3.6	66.2	1.8	135.0	22.2	88.3	14.8
	50+	2	4.3	2.0	...	66.0	2.0	95.0	7.0	62.3	...
	Total :-	47	100.0								
B											
Electric Equipment Manufacturing Co., Ltd.	16-19	29	33.0	6.2	2.0	64.4	2.3	105.4	12.4	85.0	11.1
	20-29	39	44.3	5.1	2.1	64.5	2.2	109.5	12.0	81.0	8.0
	30-39	10	11.3	5.8	5.0	65.2	2.4	114.0	24.0	83.0	10.0
	40-49	6	6.8	7.0	4.2	65.7	3.1	124.8	28.7	81.2	15.9
	50+	4	4.6	5.8	3.1	65.3	1.8	110.2	21.8	75.3	14.1
	Total :-	88	100.0								
C											
Malik Muhammad Din & Sons, Steel Rolling Mills.	16-19	7	4.8	4.7	1.4	64.0	2.6	91.0	5.7	84.7	5.1
	20-29	87	60.0	4.8	2.1	65.4	1.7	114.4	11.6	81.8	5.2
	30-39	31	21.4	4.5	2.0	65.4	2.0	107.5	19.2	85.0	10.1
	40-49	13	9.0	4.6	1.4	64.2	2.8	107.5	10.2	79.0	7.0
	50+	7	4.8	5.0	2.0	66.0	2.1	116.6	12.2	78.4	8.3
	Total :-	145	100.0								

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Industrial Concern	Age range (years)	No. of persons examined		Skinfold Thickness (m.m.)		Height (Inches)		Weight (Pounds)		Percentage of Standard Weight	
		Sample	% of Total	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
D											
Kaycee Industries, Ltd. Electric Fans Manufacturers.	16-19	8	6.1	4.8	1.0	64.5	1.4	107.7	5.8	84.3	6.0
	20-29	72	54.5	5.0	1.5	65.1	2.0	114.4	11.1	82.7	6.6
	30-39	29	22.0	5.0	1.6	65.0	2.2	109.9	10.2	78.4	7.2
	40-49	15	11.3	4.0	1.1	64.4	2.8	102.1	10.5	71.0	4.8
	50+	8	6.1	5.0	2.0	65.2	1.9	119.7	19.7	79.0	10.0
Total :-		132	100.0								
E											
West Pakistan Textile Mills, Ltd.	16-19	18	9.0	5.8	2.0	65.0	2.0	107.2	13.0	83.7	7.1
	20-29	85	42.5	5.1	2.2	65.2	2.0	111.0	11.1	81.1	6.8
	30-39	62	31.0	6.2	3.3	64.9	2.4	119.1	16.2	80.0	6.9
	40-49	26	13.0	6.2	3.3	64.9	2.4	119.1	15.5	82.2	3.9
	50+	9	4.5	6.1	3.0	65.8	2.9	122.4	16.9	82.4	8.4
Total :-		200	100.0								
F											
Bata Shoe Co., Ltd.	16-19	3	0.8	9.0	5.0	64.0	2.4	113.3	8.9	96.8	14.9
	20-29	164	40.4	6.0	2.8	64.8	2.4	115.3	13.0	83.4	8.7
	30-39	150	37.8	6.0	2.9	65.4	2.0	117.0	18.2	80.1	11.8
	40-49	73	18.4	6.1	4.4	65.5	2.5	120.0	19.5	81.0	12.9
	50+	6	1.6	7.3	3.7	65.7	1.4	121.0	20.4	80.0	13.9
Total :-		396	100.0								

TABLE III

MEAN FAMILY INCOME, SKINFOLD THICKNESS AND PERCENTAGE OF STANDARD WEIGHT OF WORKERS
IN DIFFERENT INCOME GROUPS EMPLOYED IN PAKISTANI INDUSTRIAL CONCERNS

Income Group	50-99						100-149						150-199						200-249						250+					
Industries	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
Sample	...	38	40	59	123	173	5	17	56	32	36	160	22	13	30	22	25	40	5	10	6	8	9	7	15	10	13	11	5	16
Monthly In- come (Rupees)	...	62	73	79	83	88	109	129	122	101	120	119	171	166	168	164	169	171	224	228	215	217	227	218	318	275	287	342	285	355
Skinfold Thick- ness (m.m.)	...	5.4	4.4	4.5	4.2	5.9	5.4	6.1	4.6	4.6	5.1	6.2	6.7	5.8	5.6	5.6	5.9	7.3	7.4	4.7	4.9	5.6	5.3	5.7	6.2	5.3	5.4	6.6	4.6	9.2
Percentage of Standard weight	...	81	82	78	81	82	81	73	80	79	80	80	86	82	80	80	84	87	89	80	81	82	83	82	82	80	86	84	79	75

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TABLE IV
MEAN SKINFOLD THICKNESS AND PERCENTAGE OF STANDARD WEIGHT OF WORKERS
IN DIFFERENT PER CAPITA INCOME GROUPS IN
PAKISTANI INDUSTRIAL CONCERNS

Per Capita Income	1-19						20-39						40-59						60-79						80+					
	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
Mean per Capita Income (Rs.)	17	15	16	15	14	15	29	27	27	26	28	27	31	43	46	47	48	50	63	72	63	72	72	68	110	84	107	93	130	118
Sample	6	36	48	68	83	180	22	40	76	44	40	159	9	9	14	15	12	21	2	1	2	2	17	16	8	2	5	3	8	26
Skinfold Thickness (m.m.)	5.5	5.0	4.1	4.3	4.9	6.1	7.0	5.8	5.1	5.5	5.2	6.3	7.2	7.6	4.7	5.5	5.0	7.5	3.5	5.5	6.5	5.5	5.8	8.3	7.5	4.0	5.6	4.0	5.7	8.6
Percentage of Standard weight	80	80	80	78	82	81	82	82	84	80	83	83	82	87	82	80	83	87	70	81	83	83	85	90	84	81	82	79	85	89

TABLE V

FAMILY SIZE, MEAN PER CAPITA INCOME, SKINFOLD THICKNESS AND PERCENTAGE
OF STANDARD WEIGHT OF PAKISTANI INDUSTRIAL WORKERS

Family Member	1-2						3-4						5-6						7-8						9+					
	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
Number	5	9	14	8	35	39	10	29	39	28	55	84	17	18	37	41	59	136	7	16	40	34	33	54	8	16	15	21	18	43
Per capita Income	243	37	61	57	59	90	64	31	30	30	29	29	35	20	22	22	18	24	25	21	21	22	16	20	12	25	21	16	18	16
Skinfold Thickness (m.m.)	7.6	7.6	5.0	5.1	5.1	7.4	7.2	5.3	4.8	5.2	5.6	6.3	7.8	6.4	4.7	4.9	5.3	6.2	5.6	4.8	4.5	4.8	4.3	6.0	6.0	4.9	5.3	4.4	6.0	6.0
Percentage of Standard weight	84	87	81	84	82	84	82	88	84	80	83	83	87	85	83	80	80	82	80	79	80	79	79	83	84	80	83	80	80	83

"Pak. Jour. Hlth., 15 (4)"

Summary

An anthropometric survey of 1,008 Pakistani Industrial workers, employed in six factories, was conducted near Lahore. The study included measurements of height, weight, and skinfold thickness at the triceps. The family income and family size of each worker were also recorded.

Contrary to the observations of Brozek⁶ and Keys⁷, generally an increase in body fat deposition with advancement in age was not observed. Mean skinfold values were found to be much below the Western Standards¹². Evidently calories are utilized for muscle metabolism with little left for deposition. The effect of economic conditions on nutritional status is evident from Table III and IV which show that nutritional status is dependent on per capita income than on total family income. In general per capita income was found to decrease with the increase of family size (Table V). Comparatively better nutritional status of Bata workers is probably due to better working conditions as also to the fact that the workers were supplied subsidised rations by the factory management.

The results of the survey show that the nutritional status of the industrial workers needs improvement. It is also evident that stress on family planning would be useful for improving the nutritional status of the Pakistani industrial workers.

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MASS MINIATURE RADIOGRAPHIC EXAMINATION (M.M.R.)

OF

INDUSTRIAL WORKERS IN KARACHI*

BY

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In a previous paper a report on Mass Miniature Radiography of University and College students was presented. In that paper results of M.M.R. of workers in 3 Textile Mills was also briefly reported. Since then M.M.R. survey has been extended to cover Industrial workers of Karachi including those in Textile Industry. This paper presents a preliminary report of the survey carried out so far.

Karachi is an important industrial town. Apart from cottage industries which are scattered all over the city, main industries can be broadly divided in the following groups :

1. Textile.
2. Engineering.
3. Light Industries, dealing in small parts, consumer goods, pharmaceuticals, oil & flour etc.
4. Miscellaneous.

These factories and mills are located largely in 2 groups :

1. Sind Industrial Trading Estates, in the North West and
2. Landhi Industrial Estates, in the East.

The M.M.R. survey was started in the Landhi Industrial Estates and latter extended to Sind Industrial Trading Estates. The work programme was divided in the following stages :

*Read in the clinical session at Founder's Day celebration of Samli Sanatorium, 5-6 September, 1965.

PLANNING

Each mill proposed to be taken up was visited by the Medical Officers Incharge of the M.M.R. survey. The management, especially the Labour Officers or the Personnel Officers wherever available, were specially contacted and the purpose of survey was explained. Labour Officers were requested to draw up a programme of M.M.R. of the workers so as to ensure coverage of minimum of 300 workers a day. The target was seldom achieved. As most of the mills worked in 3 shifts, they had to be visited again and again to survey workers in different shifts.

Work generally started at 9.00 a.m. and finished at about one p.m. The people were queued up and were subjected to tuberculin test before they were X-rayed. The mill was visited 72 hours later for reporting of the result.

The workers, who were found to have chest x-ray shadows, were requested to attend the Tuberculosis Control & Training Centre for registration, investigation and treatment.

The survey was shifted to another mill when the work was completed or when turn-out became very poor.

Any new programme is fraught with great difficulties. It requires training of personnel, logistic arrangements and frequent revision of the programme through trial and error.

Similarly the M.M.R. survey under report met with lot of problems. The Medical Officer, the BCG and X-ray technicians etc. took some time to settle down. They had to be given basic training in theory and practice. The problem was made more difficult by transfers, resignations and promotions of personnel as often happens in any organisation.

There were occasional X-ray machine failures, upsetting the whole time-schedule. In the beginning electric current was obtained from the generators on trailers specially imported with X-ray machine. There was frequent failure of the generators, necessitating suspension of work till repairs could be effected. These break-downs resulted in several periods of forced inactivity which reflected on subsequent efficiency of the technicians. Finally a transformer was made by an ingenious electrician of a textile mill. This enabled the X-ray work to be done on current available from the mains in the mill. This arrangement worked generally satisfactorily but occasionally line-voltage dropped to such an extent that long strips of films were under-exposed making it necessary to repeat the X-ray examination. When ordering the M.M.R. Units, special provision was made for Mass Chest Cassettes but some-how during procurement, this essential item was omitted. The Cassettes supplied with the units could take only 10 ft. rolls allowing only 40 exposers at a time. The Cassettes had to be frequently

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changed and re-loaded resulting in delays. A Mobile Canvas dark-room had to be improvised to overcome this difficulty.

Response of the mills was not constant. In some of the mills the turn out was good, in others indifferent. This was generally due to 2 reasons :

1. The management often failed to produce enough number of workers for examination due to exigencies of their own work.
2. The workers in some mills did not like to be X-rayed due to fear of discharge from service if any X-ray shadow was detected in their lungs. It actually did happen in some of the mills. Some workers reported to have chest X-ray shadows, were given 2 months pay and discharged by the management. Lot of effort had to be made by the Medical Social Worker of this Centre to persuade the Mills Managers to take back some of these workers.

Very few workers came for the reading of the test. They were often directed in absentia, through the management of their co-workers to attend Tuberculosis Control and Training Centre, for investigation and treatment but a large number failed to report (Table IV).

The distances involved and transport difficulty also affected the progress. Necessarily the Industrial Areas are at the out-skirts of the city. The distance from the Tuberculosis Centre and field of operation ranged between 8 and 24 miles. A lot of time was, therefore, wasted in transportation of the staff to and from the Centre.

The present report deals with the M.M.R. of 37,247 industrial workers and others as shown in Table I.

Table I.

Textile			
Cotton	...	13,474	
Woollen	...	2,663	
Silk	...	1,313	
Total	...	<u>17,450</u>	
Engineering			
Heavy	...	632	
Light	...	378	
Total	...	<u>1,010</u>	

Light Industries	...	6,664
Office Workers	...	366
Miscellaneous Group	...	11,757
Total	...	<u>37,247</u>

Table II shows the mill-wise break-up of the total strength of the workers and number of workers covered in each mill.

TABLE II**Coverage**

Name of the Mill	Total Workers	Total Examined	Coverage
Haroon Textile Mill	... 1,800	555	31%
Rashid Textile Mill	... 1,700	612	36%
Hafiz Textile Mill	... 1,700	967	57%
Jubilee Textile Mill	... 1,300	624	48%
Dawood Textile Mill	... 5,000	1,707	34%
Adamjee Textile Mill	... 4,500	1,729	38%
Bawany Textile Mill	... 3,400	1,274	37%
Dyer Textile Mill	... 2,050	887	43%
Star Textile Mill	... 2,450	1,910	78%
Ghafoor Textile Mill	... 1,050	670	64%
Gul Ahmed Textile Mill	... 2,200	1,892	90%
Olympia Spining & Weaving Mill	... 450	240	53%
Woollen			
Valika Woollen Mill	... 4,000	2,663	66%
Silk			
H.M. Silk Mills	... 920	496	54%
Karim Silk Mills	... 700	572	82%
Al Ameen Silk Mill	... 150	92	61%
Dada Bhay Silk Mill	... 210	153	73%
Light Industries			
J.P. Coats (Pak) Co. Ltd.	... 225	197	95%
Hakimsons Commercial Industries	... 235	99	33%

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General Tyre Rubber Co.	...	560	229	52%
Pakistan Beverages Co.	...	175	152	78%
Hardware Manufacture Industries	...	148	146	99%
Pakistan Tobacco Co.	...	1,640	809	50%
Pakistan Security Printing Press Corp.	...	1,550	1,244	80%
Pakride Batteries	...	60	22	34%
Pak Central Chemical Ind.	...	115	93	81%
Parke Davis Co.	...	120	103	94%
Golden Pen Co.	...	350	348	99%
Pak Plastic Industry.	...	310	292	97%
Jhonson Philips Co.	...	210	168	80%
Crescent Pak Soap	...	425	199	71%
Burughos Welcome	...	200	150	75%
A. & B. Oil Mills	...	200	167	83.5%
Brook Bond Tea Co.	...	350	345	97%
Hoffman	...	65	36	55%
Fateh Ali Chemical Co.	...	140	130	93%
Pakistan Progressive Cement Factory	...	950	668	70%
Imperial Chemical Co.	...	310	139	40%
Hashmi Cane Co.	...	1,300	911	70%
Philips Electric Co.	...	240	50	21%
Engineering				
Hysons Steel Works	...	450	295	43%
Siemens Engineering Co. Limited	...	430	378	79%
Saifee Engineering Works	...	475	337	71%
Total	...	44,813	25,124	56%

Table III shows the prevalence of chest X-ray shadows seen in each group.

TABLE III
PREVALENCE PER THOUSAND

Textile

Cotton	...	30.2	
Woollen	...	42.8	
Silk	...	27.4	Average 33

Engineering

Heavy	...	58.5	Average 53
Light	...	47.6	

Light Industries ... 28.5**Office-Workers** ... 6.2**Miscellaneous Group.** ... 27.0

Subjects found with chest X-ray shadows were advised to attend the Tuberculosis Control and Training Centre, Karachi for examination and treatment if necessary. The response was however, very poor and very few patients attended the Tuberculosis Centre for examination. The result of such examinations is reproduced in Table IV.

TABLE IV

	Cases with chest X-ray Shadows	Cases Registered In. T.B. Centre	Sputum Positive (Smear & Cult).
Textile Mills	557	122	11 9%
Engineering	55	21	2 9.5%
Light Industries	190	35	5 14.3%
Office-Workers	2	1	...
Miscellaneous Group	318	99	8 9%
Total :	1,122	278	26 9.4%

Out of the total number of 37,247 persons X-rayed, industrial workers numbered 25,124. There were some industrial workers in P.I.A. which could not be included in the group of industrial workers. From the records it was found that family members had also been included in the examination of P.I.A. workers. As the records could not be separately identified, P.I.A. group was excluded from Industrial workers and bracketed with the miscellaneous group.

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The light industries group consists of heterogeneous industries having establishments of about 200. In this group are included industries, such as Chemicals & Pharmaceuticals, Rubber and Tyre, Beverages, Tobacco, Printing Presses, Paints, Hardware etc.

The miscellaneous group consists of various units and establishments who made a request for M.M.R. and who were included in the programme when there was a gap in the survey of factory workers for one reason or the other. The largest group consisted of Police-personnel. Others included in this group were P.I.A. workers and families, families of Pakistan Air Force Station, Staff-Colony of Ojha Sanatorium, families of the Printing Press and people of some new colonies. The family members of some of the mill-workers residing near the mills were also included in the miscellaneous group.

Results

Of the total of 37,247 subjects surveyed, 25,124 were industrial workers and 11,757 were in miscellaneous group. Overall prevalence of all the subjects surveyed was 30 per thousand. This compares with overall prevalence of 38 per thousand reported for Karachi by the National Prevalence Survey conducted by the Government of Pakistan in co-operative with W.H.O.

Prevalence as found in the present survey in industrial workers taken as whole was 32 per thousand and of those in miscellaneous group, 27 per thousand.

In the textile workers the prevalence ranged from 27.4 per thousand in silk mills to 42.8 per thousand in woolen mills.

Among textile mills taken individually, the range was from 14 per thousand (Star Textile Mills) to 84 per thousand (Haroon Textile Mill), average about 33 per thousand.

The highest prevalence was found in Engineering Industries, these being generally heavier industries. Higher prevalence rate was found in Heavy Engineering Industries (58.5 per thousand) as compared with 47.6 per thousand in light Engineering Industry. The number of subjects surveyed in this group was rather small (1,010).

In the light industries, prevalence ranged from 0.6 per thousand in Crescent Pak Soap to 68.5 per thousand in Hardware Industry and 65.8 per thousand in A & B Oil mills. As a matter of fact Hardware Industry could be classed as Light Engineering Industry. Overall prevalence in the entire group of Light Industries was 28.5 per thousand.

Prevalence in the miscellaneous group was 27 per thousand. This is too heterogeneous a group to make individual analysis and comparisons.

A small group of 366 office-workers belonging to U.S. Aid was also surveyed. Only 2 workers were found with minimum shadows (6 per thousand). None of these subjects had positive sputum. This low yield was probably due to very stringent pre-employment medical examination which also included chest X-ray.

It will be interesting to note that in a recent survey of University and College students the prevalence rate was 10 per thousand.

Very few of the cases with chest X-ray shadows reported at the Centre for investigation and treatment. Of the 278 people who did report 26 (9.4%) were found to excrete tubercle bacilli (smear & culture). This compares with 22.2% of positive sputum of all the cases diagnosed in Tuberculosis Control and training Centre, during 1964. It is tempting to conclude that most of these cases were discovered in pre-infectious state, a point in favour of mass radiographic survey. But as the people with X-ray shadows who did not report to Tuberculosis Centre for investigation (844) vastly outnumber those who did report (278) it is possible that infectivity rate might have been different if all the cases had been subjected to sputum examination.

Although this survey deals with organised population, coverage has not been satisfactory. It ranged from 21% to 99% but on an average only 56%. It is, therefore, apparent that for a programme like this survey to succeed, intensive health education is an essential pre-requisite.

Absence of health education programme was badly felt in the course of this survey. If health education is necessary for organised population like Industrial workers, it is far more essential when M.M.R. of general population is to be undertaken.

Conclusions

Compared with persons in miscellaneous group, which appear to consist of a cross section of population, prevalence of chest X-ray shadows in industrial workers is slightly higher (32 per thousand) as against 27 per thousand in miscellaneous group. The difference is statistically significant.

This rate (32 per thousand) compares adversely with College and University students (10 per thousand) but favourably with overall prevalence rate for Karachi (38.5 per thousand) found by National Survey and is somewhat similar to that found in Police personnel in Karachi (34.9 per thousand).

Of all the Industrial workers, those engaged in light Industries had prevalence rate (28.5 per thousand) nearest to the miscellaneous group.

The highest prevalence of 53 per thousand was found in Engineering Industry.

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In this group also higher rates (58.5 per thousand) were found in Heavy Engineering Complexes.

There have been lot of teething troubles in the M.M.R. surveys in Karachi, some of which still plague the work. However there is no ground for discouragement. When most of the problems have been solved and the work stream-lined, it is hoped that M.M.R. surveys will play their own part in our fight against tuberculosis.

Summary

This is a preliminary report on the result of M.M.R survey of 37,247 subject, consisting of 25,124 Industrial workers, 366 office-workers and 11,757 subjects in miscellaneous group.

An overall prevalence rate of 32 per thousand chest X-ray shadows was found in Industrial workers compared with 27 per thousand in the miscellaneous group. Prevalence in textile workers was 33 per thousand. The group closest to the miscellaneous group was that of Light Industries (28.5 per thousand).

Highest prevalence rate was found in the Engineering Industries, (53 per thousand). In this group still higher rate (58.5 per thousand) were found in Heavy Engineering Industry.

Reference

Yad, M. Iqbal & Akhtar, M.S. Unpublished Report West Pakistan-Tuberculosis Prevalence Survey Report, Government of Pakistan, Ministry of Health.

A CONTROLLED CLINICAL TRIAL OF 4-4-DI-ISO-AMYLOXY-THIOCARBINILIDE (ISOXYL)

A New Anti-Tubercular Drug*

BY

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Search for new anti-tubercular agents is on. Although I.N.H. is a potent and remarkably safe drug, there is no other satisfactory drug which can be used in combination with it for long durations.

More and more cases are becoming resistant to the major drugs, new drugs are needed to continue the treatment, either to prepare cases for surgery or to complete the cure. Unfortunately, most of the second line drugs developed so far, have proved unsatisfactory for reasons of cost, toxicity or weak action.

The tuberculostatic effect of 4 - 4 - di - iso - amyloxy thio-carbinilide (Isoxyl) was discovered in 1953 (Bun-Hoi et al.). In vitro experiments (Trnka, R. Urbancik)¹ (Luchesi 1963)² showed good bacteriostatic effect of Isoxyl in concentrations of 0.1 - 5 gamma/ml.

Freerksen and others³ showed that a better effect was obtained in mice with a dose of 100mg/kg body weight than with PAS 500 mg/kg body-weight. On the other hand, the effect was somewhat worse than with Ethionamide 50 mg/kg body-weight and clearly worse than with Isoniazide 5 - 10 mg/kg body-weight or Streptomycin 50 mg/kg body-weight. He recommended Isoxyl as a good second line agent in cases of tuberculosis, with a dosage 3 to 6 gm. per day. During the years 1961-64 several investigations have been carried out on the effects of Isoxyl in different combinations in cases of Pulmonary tuberculosis in man (G. Fegiz, G. Favez et al. K.K. De Voogd and A.M.W. Hekking, R.S. Mitchell et al., J. Logan, H Butt and others)^{4 5 6 7 8 9}. These investigations confirmed that Isoxyl was well tolerated and that it could be used as a second line drug. But at the time when we were reviewing the first few reports in 1962, we found that till then only a few and sporadic cases had been reported without subjecting the drug to a controlled clinical trial. It was, therefore, decided to conduct such a controlled trial in the newly diagnosed (virgin) cases of Pulmonary Tuberculosis in T.B Control and Training Centre,

*Paper read at VIII all Pakistan Tuberculosis Conference, Dacca, 1965. (Final Report)

Karachi. It was decided to observe all the cases for a minimum period of one year. The trial started in October 1962 and completed in June 1964. This report presents the results of 12 months treatment and observation.

Objects of the trial :

To find out whether—

- (1) Isoxyl was safe for prolonged use,
- (2) It was effective and
- (3) It could be used as a companion drug to INH:

The following criteria were fixed for eligibility of cases in the trial :—

- (a) Freshly diagnosed cases, without or with less than 2 weeks anti-tubercular treatment, prior to entry to the trial.
- (b) Cases with positive sputum or overwhelming X-ray evidence of tuberculosis.
- (c) Age within 20 - 50 years.

The following types of cases were excluded :—

Cases with very poor general condition, or those having complications, such as pleural effusion or those with advanced disease were excluded ; also were excluded cases with obvious kidney or liver disease, diabetes mellitus, epilepsy, etc. Cases which were likely to move out of Karachi, or who lived in far flung areas were also excluded.

It was decided to include at least 20 cases in each group. The cases included in the trial were assigned to one group or the other by strict rotation at the time of entry. All the groups were given the same attention. No addition or alteration to treatment was made except by the trial officer ; no change in groups was allowed.

A record of patient's personal data, symptoms, weight, blood count, urine, sedimentation rate and quantity of sputum was maintained and checked every month. These cases were initially diagnosed by means of 70 mm X-ray films. On their entry into the trial a standard 12×15" size film was taken, and the personal X-ray factors were carefully recorded and kept constant throughout the trial. The X-ray films were read by two medical referees independently, without having knowledge of the drug regimen or sequence of films. The radiographical changes were reported as the sum total of the lesion in terms of interspaces and total size of cavities in cms. In case of major discrepancy between the two medical referees the case was submitted to a third referee to resolve the discrepancy. This referee, too, did not have the knowledge of drug regimen or sequence.

On their entry into trial, 24 hours collection of sputum was obtained and examined by direct smear and cultured by Nassau's technique. Sensitivity tests were carried out by making subcultures on solid media incorporating the following concentrations per ml. :—

I. N. H.	1	2	3
I. N. H.	0.2 mcg.	0.4 mcg.	0.8 mcg.
P. A. S.	1 mcg.	2 mcg.	4 mcg.

Sensitivity tests on Isoxyl were carried out in Dubos liquid media incorporating 1, 2 and 4 mcg/ml of Isoxyl.

Culture strains were reported as sensitive or resistant according to the growth as follows :—

Growth	+	=	resistant	Report on Sensitivity Test
No growth	0	=	sensitive	1 2 3
(or less than 20 colonies)				Control Isoxyl

INH

Pas.

All cases were given supply of respective drugs for one week. They were interviewed every week and the symptoms referring to the disease as well as of intolerance, if any, were noted. They were visited regularly by the "Health Visitors" of this centre to ensure regular intake of drugs, to collect sputum, to note symptoms of intolerance and to give guidance to the patients. The health visitors also performed ferric-chloride test for P.A.S. at random.

Treatment :

Originally it was decided to use 6 gms. of ISOXYL in A Group and 4 gms. of ISOXYL in the B Group. But due to mistake only six tablets of half gm. ISOXYL were issued to A Group instead of six grams of 12 tablets. Similarly in the B Group, instead of 4 gram. only 4 tablets of half gm. were issued. The mistake was discovered quite late after treatment had progressed for more than two months. It was, therefore, decided to continue the trial with lower dosage of ISOXYL. Three groups of chemotherapeutic regimens were used :—

Group A. : ISOXYL 3 gms. + INH 300 mg. daily, divided in 3 equal doses.

Group B. : ISOXYL 2 gms. in 2 doses + INH 300 mg in 3 doses.

Group C. : PAS sodium 10 gmss. in 4 doses + INH 300 mg. in 3 doses

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TABLE - I

THE CONDITION ON ADMISSION

GROUPS			A	B	C	
Males			16	15	17	
Females			4	5	3	
Average age in years			32	34	34	
General condition	{	Good	...	...	...	
		Fair	6	6	3	
		Poor	14	14	17	
E. S. R. (mm/hr.)						
		0-20 mm.	...	5	5	
		21-50 mm.	8	7	6	
		51-100 mm.	8	6	6	
		101-above mm.	4	2	3	
Average Weight (Stones)			6.8	7	6.7	
Sputum	{	Positive	15	8	5	
		Negative	5	12	15	
X-Ray	{	Extent				
		{	Unilateral	8	11	7
			Bilateral	12	9	13
	{	Zone-Average	2.7	2.2	2.2	
		{	Absent	4	11	12
			Present	16	9	8
			Average	4.2	2.6	2.3
	Diameter (Cm)					
Total			20	20	20	

On Admission :

It was decided to assign a minimum of 20 cases to each of the three groups. The condition of the cases on admission was as shown in table I. It will be seen that the cases in Group A, B and C were equally distributed so far as sex, age, and general condition were concerned. So far as the sputum was concerned, there was a higher number of cases with positive sputa in A Group as compared with B and C Groups. Similarly, cases in the A Group had a slightly heavier involvements as seen in the X-ray films and larger size of cavitation. Unfortunately practically half of the cases failed to continue the trial for full one year for one reason or the other. In Group A 3 patients left the town, two in the third month and one in the eighth month. Two cases were excluded because they were found taking other drugs privately. Two more cases had to be excluded from the trial as their first sensitivity-reports showed resistance to INH. One case died in the 10th month. This has been the only mortality in the cases observed in the whole of the trial. Thus out of 20, only 12 cases completed 12 months observation.

In Group B, 9 cases had to be excluded from the trial : one due to primary resistance to INH, 2 on account of taking drugs privately and the others for going away or discharging themselves.

In group C, only 10 out of 20 cases were left at the end of the 12 months. One case was excluded from the trial on account of primary resistance to INH and PAS, the others left Karachi or discharged themselves. This out of these three Groups 12, 11 and 10 completed 12 months treatment in the Group A, B, and C respectively. These cases could not be replaced because of the limited quantity of ISOXYL available.

RESULTS :**Side Effects (Table II).**

No serious side effect was seen in any of these drug groups and none of the cases had to be excluded on account of intolerance.

G.I.T. disturbances neurological involvements, respiratory symptoms, like cough or breathlessness, pain in chest, were distributed more or less equally in all the three groups. There were no CVS or urinary complications. One case in A group showed a mild fine pigmented rash over the arms and the back. It was easily controlled with administration of anti-histaminics. Instance of diarrhoea was more common in PAS Group than either of the two ISOXYL Groups.

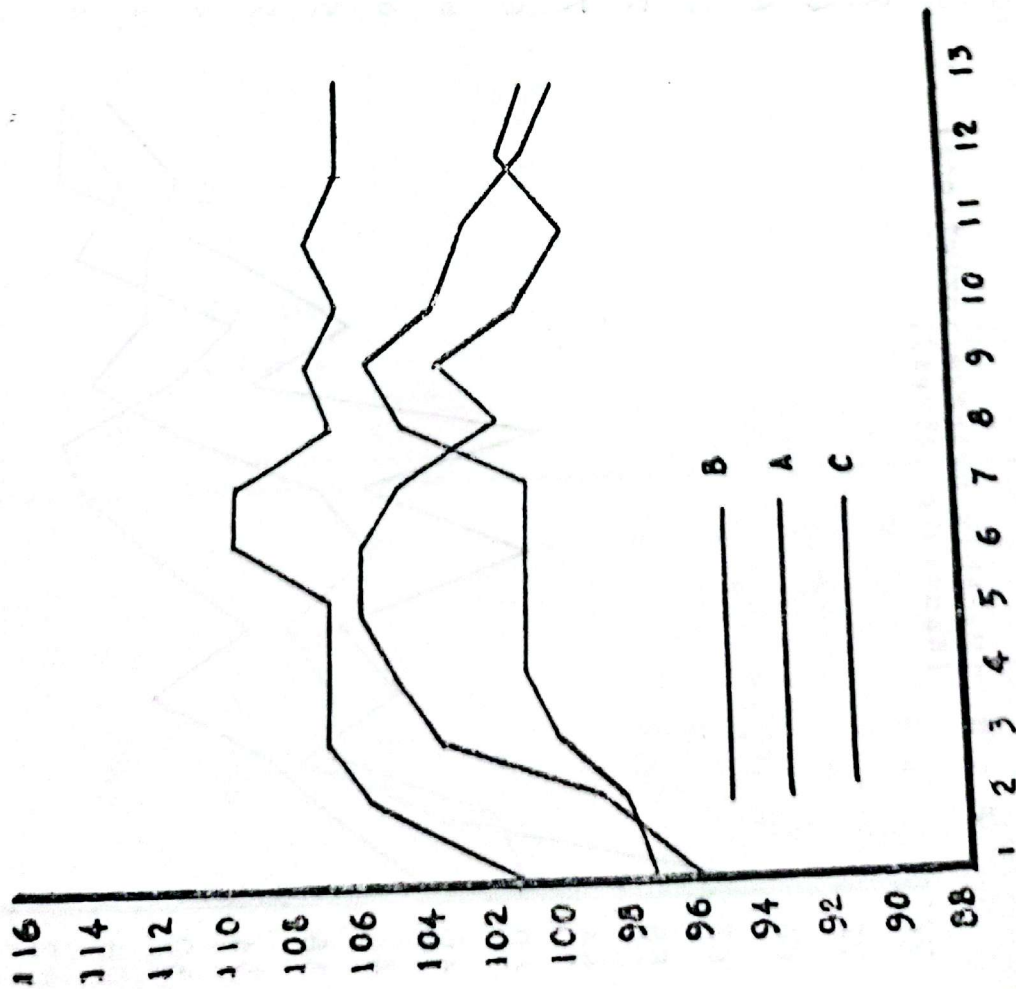
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TABLE II
SIDE EFFECTS

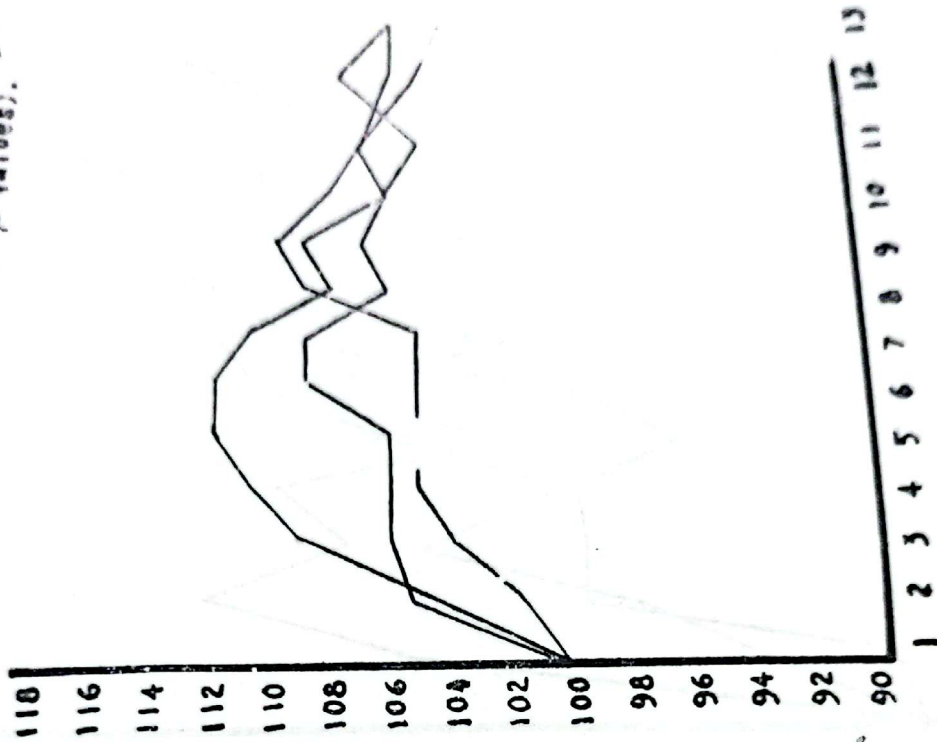
		months	months	months	months	Total number of patients tri- estrially presenting side effects in group.		
		3	6	9	12	A	B	C
G. I. T.	A	...	1	...	1	2	...	...
	B	1	...	...	1	...	2	...
	C	2	1	1	...	...	...	4
Neurological (Peripheral Neuritis)	A	2	1	...	1	4	...	...
	B	1	1	...	...	...	2	...
	C	2	...	1	...	...	...	3
Respiratory	A	1	1	1	1	4	...	...
	B	...	...	...	...	...	...	...
	C	...	...	...	1	...	...	1
C. V. S.	A	...	...	...	...	...	...	...
	B	...	...	...	...	...	...	...
	C	...	...	...	...	...	...	...
Urinary	A	...	...	...	...	...	...	...
	B	...	...	...	...	...	...	...
	C	...	...	...	...	...	...	...
Skin	A	1	...	...	...	...	...	...
	B	...	...	...	...	...	...	...
	C	...	...	...	...	1	...	...

III.

WEIGHT (Monthly average variations).
(Absolute values)



WEIGHT. (Monthly average).
(% Values).



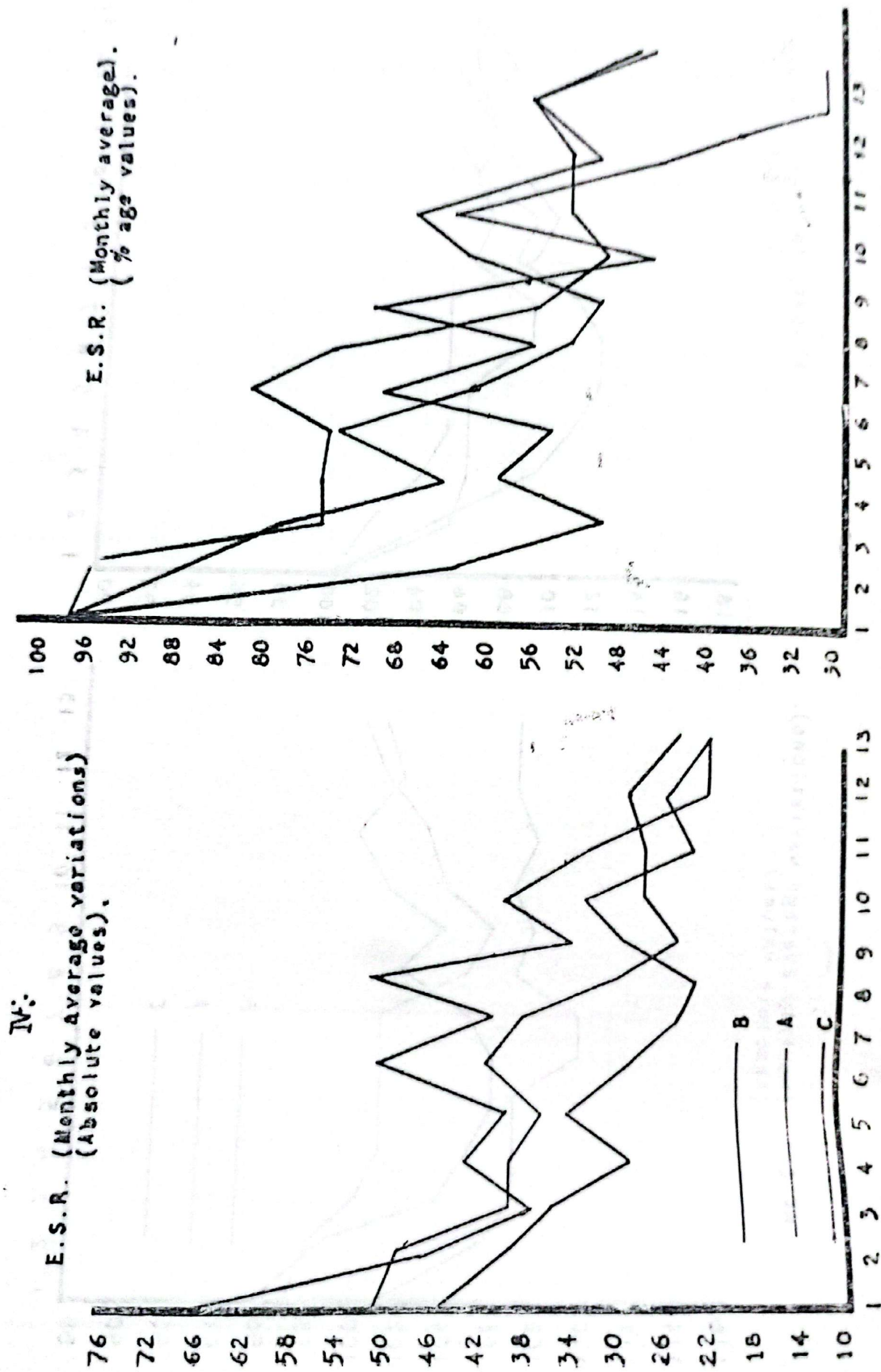


TABLE V
RELIEF OF SYMPTOMS

		Improved				Deterioration			No Change		Total			
		Improved			Deterioration									
		Marked	Slight	Total	Marked	Slight	Total							
After 3 Months	A	4	8	12	67%	...	2	2	11%	4	22%	18	...	...
	B	...	10	10	67%	1	1	2	13%	3	20%	...	15	...
	C	...	15	15	78%	1	1	2	11%	2	11%	...	...	19
After 6 Months	A	...	7	7	50%	2	5	7	50%	...	...	14	...	...
	B	1	4	5	39%	...	1	1	8%	7	54%	...	13	...
	C	...	7	7	41%	...	6	6	35%	4	24%	...	...	17
After 9 Months	A	2	5	7	58%	2	3	5	42%	...	...	12	...	...
	B	...	2	2	15%	...	...	...	...	11	85%	...	13	...
	C	...	5	5	42%	...	3	3	25%	4	33%	...	...	12
After 12 Months	A	3	1	4	33%	...	1	1	8%	7	59%	12	...	...
	B	4	1	5	45%	1	...	1	9%	5	46%	...	11	...
	C	1	2	3	30%	...	1	1	10%	6	60%	...	...	10

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TABLE VI
SPUTUM QUANTITY

	Increase				Decrease				No change			Total		
	Marked	Moderate	Slight	Total	Marked	Moderate	Slight	Total				A	B	C
After 3 months	A	...	4	...	4 : 23%	3	5	3	3	11 : 61%	3	18	...	...
	B	...	2	...	2 : 13%	2	7	1	3	10 : 67%	3	...	15	...
	C	...	...	...	...	3	7	6	3	16 : 84%	3	...	...	19
After 6 months	A	...	2	1	3 : 21%	2	2	3	4	7 : 50%	4	14	...	...
	B	...	2	1	3 : 23%	1	3	2	4	6 : 46%	4	...	13	...
	C	1	2	1	4 : 23%	...	3	6	4	9 : 53%	4	...	...	17
After 9 months	A	...	1	1	2 : 18%	...	1	4	5	5 : 41%	5	12	...	...
	B	1	2	1	4 : 31%	...	4	1	4	5 : 38%	4	...	13	...
	C	1	...	4	5 : 41%	...	2	3	2	5 : 41%	2	...	...	12
After 12 months	A	...	2	1	3 : 26%	...	1	3	5	4 : 32%	5	12	...	...
	B	1	...	2	3 : 27%	...	...	3	5	3 : 27%	5	...	11	...
	C	...	...	3	3 : 30%	...	...	3	4	3 : 30%	4	...	...	10

SPUTUM CONVERSION

		0	3 months	6 months	9 months	12 months
A	—	5 25%	9 50%	8 57%	6 50%	8 67%
ISOXYL 3 g.	+	15	9	6	6	4
Total number of patients		20	18	14	12	12
B	—	12 60%	9 60%	10 77%	10 77%	8 73%
ISOXYL 2 g.	+	8	6	3	3	3
Total number of patients		20	15	13	13	11
C	—	14 70%	16 84%	12 71%	11 92%	9 90%
PAS 10 g.	+	6	3	5	1	1
Total number of patients		20	19	17	12	10

SPUTUM CONVERSION

PATIENTS COMPLETING ONE YEAR TREATMENT

		0	3 months	6 months	9 months	12 months
A	—	4	6	7	6	8
ISOXYL 3 g.	+	8	6	5	6	4
Total number of patients		12	12	12	12	12
B	—	7	7	8	8	8
ISOXYL 2 g.	+	4	4	3	3	3
Total number of patients		11	11	11	11	11
C	—	7	10	8	9	9
PAS 10 g.	+	3	...	2	1	1
Total number of patients		10	10	10	10	10

— SPUTUM NEGATIVE

+ SPUTUM POSITIVE

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Weight Changes (Figure III, A & B).

The average weight of all the cases included in the trial was 6.8 stones at the start of the treatment. All the cases gained weight rapidly in the first three months, thereafter there were only slight fluctuations.

Sedimentary rate (Figure IV, A & B).

A steep fall was observed in average sedimentation rate values in the first three months, thereafter the average rates came down slowly. Of the three groups, those in Group A showed slightly greater fall in average sedimentation rates compared with the other groups.

Relief of symptom (Table V).

There was a rapid relief of symptom in all the 3 groups in the first three months. At the end of the 12th months, relief of symptoms was seen 33% in A Group, 45% in the B Group and 30% in the C Group. Deterioration was seen 8% in A Group, 9% in B Group, and 10% in C Group.

Sputum changes (Table VI).**Quantity.**

The volume of sputum decreased more rapidly in Group III initially, that is, at the end of the first three months. Afterwards decrease in the volume of sputum was practically similar in all the 3 groups and at the end of the 12 months, 32% in A Group, 27% in B Group and 30% in C Group showed continued decrease in the quantity of sputum. Similarly in 20% in A Group, 27% in B Group and 30% in C Group the quantity of sputum was greater compared with that at 9 months.

Sputum conversion (Table VII).

To start with, a large number of sputum positive cases were found in the A Group. At the end of the 12 months of highest sputum conversion occurred in C Group i.e. 91% as against 67% in A and 73% in B Group. Of all the 33 patients completing 12 months observation, 8 out of 12 were initially positive in Group A, 4 out of 11 in Group B and 3 out of 10 in Group C. Sputum conversion at the end of 12 months was found as follows: Group A: 4 out of 8, Group B 2 out of 4, Group C 3 out of 3.

Sensitivity status: There was a delay of two months in starting sensitivity test against ISOXYL. However, in these cases which were still positive at the end of 12 months and who had the subcultures subjected to sensitivity test for ISOXYL, none of the

cases showed initial resistance to ISOXYL. Primary resistance to INH + PAS were as follows :—

	INH	PAS	BOTH
Group A	2	—	—
Group B	1	—	—
Group C	—	—	1

No instance of any drug resistance was found till the end of 9th month of treatment in any of the 3 groups. Only 1 case of drug resistance was seen in a patient in Group A who died in 10th month. He had started with a positive culture, sensitive to INH and PAS. Sensivity to ISOXYL could not be decided initially because of negative culture after first month. In the 7th month, however, his sputum culture was found positive : during the same period his clinical condition also started deteriorating. His bacilli were found sensitive to INH but resistant to ISOXYL. As he died subsequently no further studies were possible. As the end of 12 months, of the seven cases who were still positive, none showed resistance to INH, PAS or ISOXYL. A higher contamination rate was found in sensivity tests on liquid Dubos media for ISOXYL (6.2%) than with solid media (3.5%) for INH + PAS.

Radiological changes. (Table VIII).

Rapid improvement in chest X-ray shadows was seen in Group A and Group B compared with Group C at the end of the 3rd and 6th months. At the end of the 12th month improvement in Group was inferior to that in Groups A and C. At the end of 12 months further deterioration occurred only in cases in Group B. Taking into consideration radiological changes in the cases that completed 12 months observation of treatment (Table IX) all cases in Group A and C showed improvement, whereas one case in Group B did not show any improvement. None of the case which completed 12 months showed deterioration, although X-ray improvement was superior in Group A and C, compared with that in Group B. One case in Group A (No 3,82,358) who had heavy pulmonary disease to start with showed satisfactory improvement till the 8th month, but then his condition started deteriorating. He developed fresh cavity in the left lung. As his condition showed rapid deterioration, he was withdrawn from the trial, in the 9th month and treated with streptomycin, INH and PAS. He died suddenly at home of shock after an acute spasm of breathlessness. He may have developed a spontaneous pneumothorax.

Discussion & conclusions :

When this trial was planned in 1962, very few reports were available of the use of Isoxyl in man. These reports consisted of treatment of a small number of cases

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TABLE VIII
RADIOLOGICAL CHANGES

RADIOLOGICAL CHANGES														
		Improved						Deterioration		No Change		Total		
		Marked		Slight		Total								
3 Months	A	4	22%	11	61%	15	83%	2	11%	1	6%	18		
	B	4	27%	8	53%	12	80%	...	...	3	20%		15	
	C	3	16%	10	53%	13	69%	4	5%	5	26%			19
6 Months	A	4	29%	1	7%	5	36%	3	21%	6	43%	14		
	B	2	15%	4	31%	6	46%	1	8%	6	46%		13	
	C	1	6%	5	29%	6	35%	3	18%	8	47%			17
9 Months	A	...	...	5	42%	5	42%	4	33%	3	25%	12		
	B	...	...	7	54%	7	54%	...	...	6	46%		13	
	C	1	8%	5	42%	6	50%	...	...	6	50%			12
12 Months	A	5	41%	7	59%	12	100%	...	...	...	...	12		
	B	...	...	5	45%	5	45%	4	36%	2	19%		11	
	C	...	...	6	60%	6	60%	...	...	4	40%			10

resistant to the major drugs. Two points were noted, however from these reports, one that Isoxyl was well tolerated and the other that it showed promise as an antitubercular agent.

It was therefore, decided to conduct a trial in T.B. Control and Training Centre, Karachi. As against other trials by then reported, our trial included only virgin cases who had not received any other tubercular treatment previously. Another feature of this trial was that the treatment was on an ambulatory cum domiciliary basis.

An assessment at the end of 2 months treatment showed good tolerance and no toxic effects. It was decided to carry on trial for total of 12 months. Although 60 patients started the trial (20 patients in each group) only 33 patients completed 12 months.

As the supply of Isoxyl was limited, the defaulters could not be replaced. It was unfortunate that due to initial mistake Isoxyl had to be given at dosage lower than those indicated by in vivo experiments previous trials. Even then the results are encouraging.

Isoxyl appears to be a fairly safe drug for prolonged use, as observation over a period of 12 months has shown no serious side-effects with the use of Isoxyl + INH (Group A+B). In fact with the reduced dosage used, G.I. tract disturbances were even fewer than in PAS + INH (Group C). Neurological symptoms of Pyridoxin deficiency were equally distributed in the three groups and were probably due to INH. These symptoms were easily corrected by addition of pyridoxin.

There was a mild skin rash in group A, pigmented patches of fine macular rash on the extensive surface of left arm and back which were controlled with administration of antihistaminics.

There were no urinary or cardiovascular side effects. No depression of bone-marrow was observed.

Isoxyl appears to be useful as a second line drug. So far as clearance of X-rays shows and reduction in size of cavities were concerned good results were obtained in all the three groups. If the INH + PAS combination is taken as standard, results obtained with Isoxyl 3 gm. + INH (group A) compare favourably with it, those of group B appear inferior.

A comparison was made of cases leaving the trial with those completing the trial to find out if the cases with adverse results may not have left the trial. (Table IX B). It will be seen that there is no significant difference between the two groups.

As INH a potent antitubercular agent forms part of all groups, it is possible that

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good results obtained might well have been due to I.N.H., its prolonged use made possible by addition of Isoxyl and PAS.

From the observations made in this trial it appears that it is possible to use Isoxyl as a companion drug to I.N.H.

So far as the quantity of sputum was concerned, group C patients had much higher reduction at the end of three months, but thereafter, results were practically similar in all the groups, though slightly inferior in group B.

Sputum conversion was higher in the C group, 90% cases being negated at the end of 12 months, although, this group had a higher rate of initially negative culture (75%). However only one case out of three remained positive at the end of 12 months compared with 4 out of 8 in group A and 3 out of 4 in group B.

The significant fact is, that none of the cases who were initially sensitive and who still remained positive at the end of 12 months, had bacilli resistant to Isoxyl, INH or P.A.S.

Three cases initially resistant to I.N.H. and one case resistant both to I.N.H. and P.A.S. had to be excluded from the trial.

There was however one case in group A (No. 1,24,397) who had extensive X-ray involvement and was positive in the first month, but negative subsequently 2nd through 6th month. He became positive again in the 7th and 8th month and his bacilli were found to be resistant to Isoxyl. He was withdrawn from the trial but died a month later so no further examinations could be made. As sensitivity tests on Isoxyl started late, his first specimen could not be tested for sensitivity to Isoxyl.

Weight gain, relief of symptoms and fall in sedimentation rate were similar in all the 3 groups.

Conclusions

The results of this comparative study of the treatment of predominantly acute extensive pulmonary tuberculosis cases, using combination of Isoxyl with INH in different doses of Isoxyl, and INH with PAS, shows that Isoxyl is an effective companion drug for isoniazid.

The combination of INH 300 mg. daily with Isoxyl in doses of 3 gm. or P.A.S. in doses of 10 gr. was found to be more effective in producing sputum conversion than with Isoxyl 2 gr.

TABLE IX
FINAL X-RAY ASSESSMENT COMPARING
STATISTICS AT START AND AT 12 MONTHS

	IMPROVEMENT				No Change	Deteriora- tion	TOTAL		
	Marked	Moderate	Slight	Total			A	B	C
A	6	4	2	12	...	...	12	...	...
B	2	5	3	10	1	...	...	11	...
C	4	3	3	10	...	...	...	...	10

	CASES COMPLETED TRIAL			CASES LEAVING TRIAL	
	Average extent of Disease	Average size of Cavities		Average Extent of Disease	Average Size of Cavities
A	5.33	5. 1		7. 0	4.25
B	4.2	2.27		5.11	3.11
C	4.7	1. 8		4. 7	2. 4

Cases in group A (Isoxyl 3 gm.) have shown better radiological improvement while cases in group C (P.A.S. 10 gm.) better sputum conversion.

In assessing the results, it must be kept in mind that the series was small and that Isoxyl and INH group had more patients with extensive lesion and cavitation initially than the P.A.S. and INH series and less patients without initial cavitation. However, these pretreatment differences balance each other in their effects on the results and the two series may thus be regarded as reasonably comparable,

It is possible that the results could have been even more satisfactory with 4 gm. of Isoxyl daily.

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Summary

A controlled clinical trial was conducted in previously untreated cases of pulmonary tuberculosis using a new anti-tubercular agent 4'-4' di-Iso-amyloxy-thio-carbanilide (ISOXYL).

Comparison was made between three groups of cases receiving in combination with INH 300 mg/daily, (A) ISOXYL 3 gms. (B) ISOXYL 2 gms. and (C) PAS sodium 10 gms.

Initially 20 cases were assigned to each group (60 cases) but only 33 completed observation and treatment for 12 months.

ISOXYL is well tolerated, no serious side-effects were observed even after 12 months. Use of ISOXYL 2 gm. gave inferior results compared with 3 gm. of ISOXYL or 10 gm. PAS sodium.

ISOXYL 3 gm. per day was found to be of practically similar efficacy as sodium PAS as companion drug for INH 300 mg. per day producing sputum conversion, preventing emergence of INH resistant bacilli.

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INTESTOPAN IN THE TREATMENT OF CHRONIC AMOEBIASIS—PRELIMINARY
ASSESSMENT OF TRIALS CARRIED OUT IN VILLAGE SAHOWARY
(LAHORE)

By

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I. Introduction

Knowledge is a steep which few may climb
While duty is a path which all may tread.
(Sir L. Morris)

Diagnosis, prevention and treatment of amoebic dysentery have remained important aims and objects of protozoologists, public health workers and physicians. How far the different disciplines have solved the problems of their fields, is apparent from a perusal of literature. However, the fact is that the struggle has continued without cessation to one thousand, nine hundred and sixty-fifth year of our lord.

The cases of amoebic dysentery still occur, suitable drug is still searched for and the civilisation is still awaiting the dawn of that day when it will flatter to have gained an advantage over the mucus eroding protozoa and a tissue invading miner.

Every day we read of "*fascinating modern amoebicides*." How many of these stand the test of the day, is well known to the practitioners. We know that there is still need to recognise the difference between the observed and experimentally demonstrated manifestations of the therapeutic agents.

Recently Sandoz Limited (Basel, Switzerland) have introduced a new intestinal antiseptic under the trade name of *Intestopan*. It is claimed to be a powerful bacteriostatic, amoebicidal, giardicidal and mycostatic. It is also reported to be profitable in protozoal and nonspecific cases of colitis, gastroenteritis, enteritis and diarrhoeas. Its therapeutic spectrum is considerably broader than that of any other agent possessing such combined properties.

1.1. The Preparation: Intestopan (AL 307-ITP) is composed of micronised forms of the following two synthetic substances :

- (a) 7 parts of broxyquinoline : (5,7 - dibromo - 8 - hydroxyquinoline) and
- (b) 1 part of brobenzoxaldine : (5,7 - dibromo - 8 - benzoyloxy quinaldine)

Sandoz Ltd., supplied to us 10,000 tablets for clinical trials in *amoebiasis* and *giardiasis* of the intestinal tract. Each tablet contained 200 mg. of broxyquinoline and 40 mg. of brobenzoxaldine.

The two compounds exhibit maximal synergistic effect as protozoocides, bacteriocides and fungicides. Being in particulate and micronized form, the drug adequately penetrates in mucosal folds and crypts. It is not absorbed from gastro-intestinal tract and its concentration, according to Malmos *et al.* (1962), in the intestinal lumen remains at least or possibly well over 100 mcg./ml. It probably inhibits the pathogenic activity of the intestinal parasites by close-contact as well as by changing the bioenvironments. Broxyquinoline is effective against intestinal pathogens while brobenzoxaldine inhibits the activity of gram positive organisms. The two run a three-legged race and thus afford a complete spectrum of activity.

We have used ITP in a number of cases of intestinal parasitosis. Observations, made on 23 selected patients; consisting of 10 females and 13 males, are presented in this note. The ages of the subjects varied from 4 years to 70 years. All of them were co-operative and never hesitated to a clinical examination, which was made periodically during the therapeutic trials and a month after.

For critical evaluation of the symptoms in the patients, a record of pulse and temperature was made. Coprological examination were carried out exclusively to know parasite-load. A careful record was also kept for idiosyncrasies, allergic reactions and side-effect manifestations during drug therapy. No occasion warranted a haematological investigation. Kidney function test, liver function test and electro-cardiographic tracing were not made. Our patients usually do not render to sigmoidoscopy and therefore, we did not attempt it in this preliminary work lest the co-operation offered may not be denied.

2. Wave of evidence :

Who does the best his circumstances allows,
Does well, acts nobly, angels could no more.
(Young)

ITP is being studied since 1959. Clinical studies have by now been made in almost all parts of the world and encouraging results have been obtained. In view of the broad spectrum activity of ITP, the trial have been made in a great variety of clinical conditions, ranging from summer diarrhoea to amoebic dysentery.

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2.1. **Severe and acute Enteropathy :** Albano and Collaborators (1962) found marked improvement on second day and complete cure after 5-6 days in 16 patients with acute gastroenteritis when put on ITP. An adult received 2-3 tablets, t.i.d. for 5-6 days.

Barba and others (1961) obtained excellent results with ITP and A I 306 in 33 patients complaining of acute gastro-intestinal disorders.

Malamos *et al.* (1962) stated that AI.307 gives freedom from symptoms and removes signs of active colitis in all cases of *amoebiasis* passing vegetative forms and all cases of *giardiasis* passing both cysts and trophozoites.

2.1.1. *Summer diarrhoea :* Albano *et al.* (1962) treated successfully 30 cases, including 10 infants, of summer diarrhoea with ITP. All the cases recovered within 3-4 days.

2.1.2. *Acute diarrhoea :* Albano *et al.* (1962) treated 5 patients suffering from acute diarrhoea due to parasitic infections with ITP. Striking curative action was reported within 3-4 days. Specific treatment and common anti-diarrhoic drugs had not had any effect on these patients.

28 cases of diarrhoea responded excellently to ITP and AI.306 treatment (Barba *et al.* (1961).

Robert (1962) treated 20 patients suffering from diarrhoea due to colitis with ITP and obtained excellent results. 70 per cent responded extremely well, in 10 per cent each, the results were either moderately successful or did not help much. Each patient received initially 6-9 tablets of ITP per day for 10 days and 1-3 tablets per day thereafter for a few days not exceeding 5 days.

According to Salem *et al.* (1962) amoebic diarrhoea stops within 5-15 days (on an average 6-4 days) after treatment with ITP.

Vaccari *et al.* (1963) stated that ITP is excellent and efficient in ameliorating acute, sub-acute and sub-chronic diarrhoeal symptoms. The observations are based on 67 cases.

2.1.3. *Enterocolitis :* Barba *et al.* (1961) treated 60 cases of acute (50 cases) and exacerbated (10 cases) enterocolitis with ITP and obtained excellent results.

Malamos *et al.* (1962) found ITP useful both in protozoal and nonprotozoal cases of colitis.

The therapeutic effects of ITP, in all cases of bacterial and amoebic colitis, were found encouraging by Robert (1962).

Russo et al. (1962) treated 19 cases with acute enterocolitis with ITP. The adults, according to the seriousness of the case, received 6-8 tablets daily. The therapeutic effect was found to be fairly quick and excellent.

Vaccari et al. (1963) obtained brilliant results in 6 cases of ulcerative colitis with ITP.

2.2. Chronic Intestinal Diseases :

Albano et al (1962) found lasting improvement in 16 cases of chronic enteropathy after a course of ITP.

Malamos et al (1962) found ITP to be useful in chronic colonic disorders.

Salem et al (1962) obtained prompt clinical amelioration of dysenteric symptoms—colic, tenesmus and tenderness over lying colonic area—within one week of treatment with ITP.

ITP is also highly effective in relieving intestinal disorders occurring during anti-biotic therapy. 3—9 tablets for 1—6 days usually restore the patient to normal state of health.

2.3. INTESTINAL PARASITOSIS :

2.3.1. **Amoebiasis :** Albano et al (1962) successfully treated two cases of amoebic colitis with ITP. The parasitological cure was rapid while the clinical improvement occurred in about a month.

Ata et al. (1961) treated 26 cases of amoebiasis with Al. 306 (closely allied to ITP). It had dramatic effect in 23 cases, where the parasitological cure was obtained in 5½ days on an average. In other three, however, marked improvement in clinical condition was observed. Two of these cases had complete cure with ITP. All the cases were kept under observation for 6—45 days (104 days). Relapse occurred in seven cases.

Barba et al. (1961) treated 5 cases of colitis ulcerosa, 3 cases of exacerbated amoebic colitis and 6 cases of cystopyelitis with ITP and Al.306 and obtained good results.

El-Rooby et al. (1962) obtained 94.6 per cent curative success with ITP as against 88.5 per cent with Al.306 in amoebiasis. ITP was, however, not found effective in cases of intestinal amoebiasis associated with bilharziasis and ascariasis. Parasitological cure in pure amoebic cases was obtained on average in 8 (4—18) days as against 5.5 days with Al.306. Amoeba free stool in amoeba-bilharzia cases were however,

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produced in longer period. Improvement in clinical condition of the patient usually occurred after 2—3 days and never took longer than 7—8 days. Relapses occurred in 26.3 per cent cases (as against 27 per cent cases treated with Al.306) which invariably responded to the second course of ITP. Two amoebic cases, which failed to respond to Al.306 or ITP were got promptly cleared after ordinary course of emetine injections.

Malamos et al. (1962) used ITP in 19 cases of amoebiasis (7 cases passing vegetative forms and 12 cases passing cysts) and found the drug useful both clinically as well as parasitologically.

Robert (1962) recommends ITP for most of the common forms of intestinal infections. Excellent improvement was recorded in all cases of amoebic colitis.

Russo et al. (1962) found intestopan effective against a case suffering from amoebic colitis.

Salem et al. (1962) observed that stools and material aspirated during sigmoidoscopy become negative for amoebae (both vegetative and cystic forms) within 4 to 10 days (8.2 days on an average) after treatment with ITP. The amoebic ulceration, however, heals in 6 to 10 days (7.4 days on an average). The rate of cure, as assessed for 60 patients followed up for 3 to 4½ months, was excellent. 78.3 per cent cases neither showed clinical nor parasitological relapse during the period of observation. In 21.7 per cent cases parasitological relapse was noticed within six weeks after completing the treatment. Both clinical and parasitological relapse occurred only in 4 (6.6 per cent) cases.

2.3.2. Entamoeba coli: Malamos et al. (1962) administered ITP to the healthy individuals and found that the colon entamoeba disappeared after a course of this drug.

2.3.3. Endolimax nana: A healthy individual passing cysts and trophozoites of the lesser amoeba lost the infection after a course of ITP (Malamos et al., 1962).

2.3.4. Dientamoeba fragilis: Robert (1962) reports that the fragile amoeba disappeared after a course of ITP.

2.3.5. Giardia intestinalis: Ata et al. (1961) obtained rapid parasitological cure and marked clinical improvement in four out of five cases of giardiasis with a course of Al.306 while El-Rooby et al. (1962) successfully eliminated *G. intestinalis* from three cases with ITP.

Malamos et al. (1962) found that 4 tablets (1g) daily of ITP for 4 days brought about a considerable decrease in quantity of *Giardia* cysts while the double this dose for 4 days

days successfully eliminated the parasite from the patients. The cases treated were passing both trophozoites (2 cases) and cysts (3 cases).

Russo et al. (1962) found ITP effective against giardiasis in children of 4-7 years of age.

Salem et al. (1962) were successful in clearing giardiasis within 7-14 days. On an average 92.3 per cent cases promptly responded to a course of ITP.

2.3.6. Trichomoniasis : Brack (1962 b) found ITP to be effective against *Trichomonas foetus* in vitro. Malamos et al. (1962) treated a case infested with *T. intestinalis* with ITP with success.

2.3.7. Helminthiasis ITP has not so far been found affecting helminthic infections co-existing with intestinal protozoas.

2.3.7.1. Trichuriasis : El-Rooby et al. (1962) did not succeed in eliminating whip-worm (*Trichocephalus trichiurus*) from a case with a course of ITP.

2.3.7.2. Strongyloidosis : Salem et al. (1962) did not find any effect of a course of ITP on thread-worm infection (*Strongyloides stercoralis*).

2.3.7.3. Ancylostomiasis : Ata et al. (1961) did not observe either clinical or parasitological improvement in five cases of hook-worm infection (*Ancylostoma duodenale*) when put on a course of Al306—a drug allied to ITP.

El-Rooby et al. (1962) had no success with ITP in four cases of *ancylostomiasis*.

2.3.7.4. Trichostrongyliasis : Ata et al. (1961) did not find any improvement in a case infected with *Trichostrongylus coulbriformis* when given a course of Al.306.

2.3.7.5. Enterobiasis : Salem et al. (1962) treated three courses of seat-worm with ITP. They claimed successful eradication of the helminth from 66.6 per cent cases within a week from starting the treatment.

2.3.7.6. Ascariasis : Ata et al. (1961) administered Al.306 to 5 cases of *ascariasis* but failed to achieve eradication.

El.-Rooby et al. (1962) failed to cure a case of round-worm infection with a course of ITP.

Salem et al. (1962) also did not find ITP effective against round-worm infection (*Ascaris lumbricoides*).

2.3.7.7. Bilharziasis : El-Rooby et al (1962) did not find ITP of any anthelmintic significance. No improvement was observed in seven cases of bilharziasis (*Schistosoma*

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haematobium). However, it was more effective to amoebic colitis mixed with bilharz dysentery.

According to Salem et al. (1962) bilharz al polypi does not change after a course of ITP.

2.3.7.8. **Hymenolepiasis**: El-Rooby et al. (1962) found that ITP was ineffective against dwarf tape-worm (*Hymenolepis nana*) infection. Salem et al. (1962) also found of no use in hymenolepiasis.

3. Observations:

For every why he had a wherefor

(Butt)

Twenty three cases, consisting of 13 males and 10 females were found passing *Entamoeba histolytica* and complaining of diarrhoea, flatulence and anorexia were subjected to a recommended course of Inetstopan. The ages of our patients varied from 6 to 14 years in males and 4 to 70 years in females.

Abdominal pain was one of the commonest complaint. In 7 cases the duration of pain was from 5-7 months, in 9 cases it was of 1-2 years while in 5 cases it was persistent since 3-4 years. In one case it periodically continued for the last 6 years. One case however, did not complain of abdominal pain.

Six cases were passing loose stools, persistent constipation was worrying three while 14 others had diarrhoea alternating with constipation.

78.26 per cent were troubled of flatulence. Tenesmus and colic was complained by 6 cases.

Stools with blood streaks and copious amount of mucus were passed by 8 cases. In 7 cases, mucus evacuated with formed or semi-formed stools, was a cause of great anxiety. In 34.78 per cent cases, there were no conspicuous symptoms of dysentery.

Three cases reported of having periodic rise in temperature. The temperature observed, varied from 98.0 to 99.0°F in males and 98.0 to 100.5°F in females.

Loss of appetite worried 10 cases. Generalised complaints however, were minor and varied which could not be attributed to amoebiasis with any stretch of imagination and are therefore, not mentioned in this note. This information is consolidated in table II.

3.1. General Examination:— All the cases under observation were subjected to a general clinical examination. A summary of observations is given below:—

3.1.1. Physical condition :

Good	Moderate	Under nourished	Dehydrated and emaciated.
7	6	8	2
30.4%	26.1%	34.8%	8.7%

3.1.2. Conjunctiva and nails :

Pink	Light Pink	Pale
8	8	7
34.8%	34.8%	30.4%

3.1.3. Temperture :

Normal	Above normal
98—98.5°F	99.00—100.5°F
17	6
73.9%	26.1%

3.1.4. Pulse rate :

Range	Range
72—90/mt.	100—130/mt.
14	9
60.9%	39.1%

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3.1.5. Tongue :

Coated white and moist/Furred and moist.	Coated white and dry/Furred and dry.	Coated Yellow and moist	Clean and moist
12	4	3	4
52.1%	17.4%	13.1%	17.4%

3.1.6. **Miscellany** : In one case clubbing of fingers and oedema of feet was also observed. Probably a mere coincidence.

3.2. **Systemic Examination** :— A careful systemic examination of the cases gave us the following picture.

3.2.1. **Abdominal Examination** :— Visible peristaltic movement was observed in one female, highly tympanic abdomen was in three and significant crepitus abdomen was observed in a solitary male.

3.2.1.1. **Abdominal condition** :—Marked tenderness was found in the abdominal regions given below :—

Iliac fossa			Epigastrium and Rt. hypochondrium.	Abdomen tender throughout.
right	left	both		
9	4	2	5	3
39.1%	17.4%	8.7%	21.7%	13.1%

3.2.1.2. **Intestinal condition** :— Caecum was found palpable and thickened in six cases.

Pelvic colon was palpable and thickened in a solitary male of 17 years.

3.2.1.3. **Liver enlargement** :— In eight of the 23 cases, the liver was tender and palpable. One finger enlargement was detected in 62.5 per cent cases.

12.5 per cent it went to two fingers, while in 25.0 per cent the enlargement was extended to three fingers.

3.2.2. Thoracic Examination :— The lungs and heart were found normal in 82.6 per cent cases. Bilaterally scattered Rhonci were detected in 13 per cent cases. In one case (4.4. per cent) however, rales at right apex and rhonci all over the chest were detected.

3.2.3. Central nervous system :— We failed to detect any abnormality suggestive of involvement of nervous system in the cases under observation.

3.3. Sigmoidoscopy :— We could not take any advantage of this method of examination. None of the cases was found willing to submit to it when ever suggested. We did not dare attempt anything beyond persuasion level, because we could not afford to loose the cooperation coming almost spontaneously at this stage.

3.4. Stool Examination :

It is basally necessary for the people to understand the purpose of an appraisal work. We made use of different ways by which effective teaching of masses could be done. These methods were used according to the limitations and were subject to the psychological status of the group. Before taking up a clinical trial, possibilities and limitations were properly studied. All out efforts were made to protect the people against the development of a feeling of either over confidence or fear. Although stool collection is a simple matter yet it was found to be a complicated affair. In our experience the work is likely to flop if proper approach is not made and group co-operation is not obtained and appropriate briefing is not done well in time. People do not ordinarily give stools for examination and do not accept any treatment even when offered without their asking for it. We imparted health education to 1,070 persons but we received unstinted help and co-operation from not more than 30-40 per cent of the total examined. Taking only adults into consideration, this proportion will not exceed 10-15 per cent.

Stool samples from all the males and females were examined both by direct and concentration methods. Cases containing copious amount of *E. histolytica* cysts were thoroughly scrutinized. A thoughtful clinical examination of all the carriers was made and case-histories were care-fully recorded.

In 6 cases *E. histolytica* occurred alone, in 8 cases *E. histolytica* was involved either with *E. coli* (3), with *I. butschlii* (1), with *A. duodenale* (1) with *E. vermicularis* (1), or with *A. lumbricoides* (2).

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In 6 cases, *E. histolytica* was found with two other parasites. The other parasites were *E. coli* + *I. butschlii* (2 cases), *E. coli* + *E. vermicularis* (one case), *E. coli* + *A. lumbricoides* (one case) and *I. butschlii* + *A. lumbricoides* (2 cases).

In two cases, it occurred with three other parasites, viz., *E. coli* + *I. butschlii* + *G. intestinalis* (one case) and *I. butschlii* + *G. intestinalis* + *A. lumbricoides* (one case).

In one case the infection was quintuple and the companions were *E. histolytica*, *E. coli* + *G. intestinalis* + *E. vermicularis* and *A. lumbricoides*.

All the 23 cases were put on the recommended course of Intestopan. Cases having another parasite or combination of parasites in addition to *E. histolytica* were also given specific treatments viz., *Alcopar* for hook-worm infection, *Helmipar* for round-worm infection and *Thymol* for seat-worm infection in recommended doses.

A month after the course of medication (ITP) a thorough clinical examination of the 23 cases was again carried out. Six consecutive coprological examinations were also made. Relapses or cases of reinfection were found out. In this report we have not differentiated between relapses and reinfections.

4. DRUG ADMINISTRATION :

And put in every honest hand a whip,
To lash the rascals naked through the world.
(Shakespeare)

All the 23 cases received adult dose of 2-3 tablets thrice daily. Each tablet consisted of 250 gm. of the active ingredients. The total dose to adults comes to 15 gm. as against 7.5 gm. to children from 4 to 10 years. 12 cases in this group were in the age group of 12 to 70 years while 6 were children of 4 to 10 years. The course of treatment was repeated after a week or so if the first round did not succeed in the amelioration of clinical symptoms or clearing of the amoebae.

Four cases of amoebic infection were superimposed on *ancylostomiasis* and were given the recommended dose of 5 gm. of *Alcopar* in addition to ITP.

Five cases harbouring round-worms in addition to *E. histolytica*, were given *Helmipar* at the rate of two tablespoonfuls at bed time daily for two days in one case of 70 years of age and for four days in other four cases.

Efforts were also made to remove general complaints. All the anaemic cases in instance were put on iron therapy. Some patients were also given multi-vitamin tablets for general weakness and avitaminosis.

4.1. Therapeutic results : Nine cases, out of eighteen complaining of flatulence, after receiving ITP became clear of symptoms. In five, the result was excellent while in four the response was moderate.

Bowels became regular and formed in 9 out of 20 cases. Constipation however, persisted in all the three cases.

Peristaltic movements were visible in a case before medication but it disappeared after a course of ITP.

Abdomen remained tympanic in all the cases after receiving ITP.

In one case, the signs and symptoms disappeared temporarily during the course of treatment.

The tenderness of the right-iliac region was relieved in five cases. In other four it persisted during ITP treatment.

The tenderness of the left-iliac region persisted in three cases while it was cleared in one solitary patient receiving ITP treatment.

A case having tenderness of both sides of iliac region was corrected after a course of ITP while in another there was no visible change.

The epigastrium and right-hypochondriac regions remained tender in one case but not at all affected in the other.

Caecum remained palpable and thickened in five cases. In one case the condition either improved or was not detected to be palpable.

There was no improvement in palpable and thickened pelvic colon after ITP treatment.

Four cases out of five having one finger enlargement of liver, improved after receiving ITP treatment. In others the liver still remained tender and palpable and the enlargement persisted to be one finger (one case), two fingers (one case) and three fingers (two cases) respectively.

Fifteen cases, out of 23 cases of chronic amoebiasis (65.22 per cent), were not passing cysts when examined for six consecutive days a month after ITP treatment. The fifteen cases consisted of 10 males and 5 females. The cure rate was calculated to be 76.0 per cent in males and 50.0 per cent in females.

Out of 6 single infection cases of *E. histolytica*, 5 (83.3 per cent) became negative after receiving a course of ITP.

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Eight men and women had double infection. 75 per cent lost *E. histolytica* infection with ease. Four cases coexistent with *A. duodenale* or *A. lumbricoides* were also given specific anthelmintic along with a course of ITP. Three cases carrying *E. coli* and one case with *I. butschlii* also became free of these protozoan parasites after receiving recommended dosage of ITP.

Three cases, with triple infection, became negative of protozoal/helminthic infection after ITP course. One case however, remained positive both for *E. histolytica* and *E. coli*. A solitary case however, remained positive after treatment with ITP. A case formerly having *I. butschlii* was found free of this protozoa after ITP course but had moderate infection of *A. duodenale* together with *E. histolytica* and *E. coli*, which persisted after ITP treatment. In another case, the triple infection of *E. histolytica*, *I. butschlii* and *E. coli* persisted after ITP course.

Two cases had quadruple infection. One case, having four protozoas viz. *E. histolytica*, *E. coli*, *I. butschlii* and *G. intestinalis*, did not respond well. All the parasites persisted as against another, who had *E. histolytica*, *I. butschlii*, *G. intestinalis* and *A. duodenale* which became free of the protozoas after taking ITP and of the hook-worm after a course of Alcopar.

E. histolytica infection did not improve in one case having four other parasites viz., *E. coli*, *G. intestinalis*, *E. vermicularis* and *A. lumbricoides*. Suitable treatment however, given for round-worm infection. Absence of *G. intestinalis* infection after treatment was however, of special interest.

5. Side Effects :

O, while you live, tell truth, and shame the devil.

(Shakespeare)

5.1. Review :— Albano et al. (1962) have stated that ITP was well tolerated by 99 patients receiving the drug under their guidance. A patient given 423 tablets for a period of 45 days did not show any ill-effects. The drug had not had any unfavourable reactions on infants either.

According to Ata et al. (1961), the patients put on Al.306 showed either rare or slight side effects. On the whole the drug was well tolerated even by the patients with severe anaemia and with border-line hepatic or renal function.

El-Rooby et al. (1962) found ITP to be well tolerated in most cases. This was well borne out by the absence of toxic effects on the bone-marrow, liver, kidneys and heart whenever tests for their functions were performed,

Malamos et al. (1962) stated that ITP was well tolerated in the administered doses.

According to Russo et al. (1962), the ITP is excellently tolerated by patients suffering from Salmonella enterides, antibiotic entero-colitis, amoebic colitis and giardic colitis. No anomaly occurred in the tests of liver and kidney functioning and blood picture.

Salem et al. (1962) did not encounter any side effects within the range of dosage used.

Vaccari et al. (1963) stated that 85 patients, complaining of acute diarrhoea, subacute or subchronic entero-colitis and ulcerative colitis, tolerated ITP when given the recommended doses.

Facial oedema :— Malamos et al. (1962) recorded facial oedema in a solitary case receiving ITP, which subsided after interruption of the treatment.

Nausea :— Ata et al. (1961) recorded mild gastrointestinal irritation in the form of nausea in some patients given Al. 306.

Epigastric discomfort :— Ata et al. (1961) stated that some patients treated with Al. 306 (precursor of Intestopan) complained of mild epigastric discomfort.

El-Rooby et al. (1962) reported epigastric discomfort in 26.3 per cent cases treated with ITP but did not find it severe enough as to stop the drug.

Pruritis :— Ata et al. (1961) recorded dermatological reaction in the anal region in five patients receiving Al. 306.

According to El-Rooby et al. (1962) 5.3 per cent cases may complain of pruritis after receiving a course of ITP.

Malamos et al. (1962) noted pruritis in a lady patient on the third day of treatment with ITP. She was reported to be allergic to various other drugs also.

Urticaria :— Ata et al. (1961) commented on a case of urticaria, supposed to be an after effect of Al 306 therapy. This patient had *ascariasis* and the rash was probably due to round-worm toxins and emanations rather than due to Al. 306.

Malamos et al. (1962) reported of urticaria in a female patient on the third day of treatment with ITP. This lady experienced allergy to various other drugs also. The allergic phenomenon subsided, when ITP therapy was interrupted.

Joint pains :— A case of *amoebiasis*, receiving total dose of 480 mg. tds of ITP for 20 days, complained of joint pains (El-Rooby et al 1962).

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Tinnitus :— A patient when put on ITP, complained of tinnitus (El-Rooby et al 1962).

Giddiness :— Some patients, when treated with ITP complain of giddiness (El-Rooby et al 1962).

5.2. Observations :— A female patient receiving ITP complained of dryness of tongue while another experienced dryness of mouth and headache.

A female, after taking ITP, complained of vertigo. It was followed by fainting attacks. This patient had bronchial asthma.

Nausea, without vomiting, was the complaint of another female case. It was experienced after 4 days of treatment and the condition was relieved when the drug was discontinued.

A very old female patient, suffering from pulmonary tuberculosis and congestive heart failure, when put on ITP for amoebic treatment complained of palpitation and headache. Due to the above complications, we do not attach these conditions to ITP treatment.

Two male patients receiving ITP experienced dryness of mouth while another complained of dizziness and dryness of mouth.

The allergic manifestations were reported by one individual, who was reported to have developed a sort of general idiosyncrasy to drugs and therefore, reaction towards ITP was not an unusual manifestation.

6. Discussion :

As children gathering pebbles on the shore

(Milton)

Numerous patients complaining of acute enteropathy viz., gastroenteritis, summer diarrhoeas, diarrhoeas due to parasites and chronic intestinal diseases viz., chronic enteropathy, enteritis of unknown origin, amoebic colitis were given 2-3 ITP tablets for 10 days. Results were excellent in 65 per cent, good in 15 per cent moderate in 10 per cent. In 5 per cent the removal of symptoms could not be achieved. Five per cent did not report back, therefore, the effect could not be evaluated. The number of patients who did not favourably respond to ITP therapy was very small.

The amelioration of symptoms were fairly quick and therefore, the drug became very popular with our patients. It is probably because the general people all

world over are more interested in the removal of symptoms than in the eradication of the causative agents. According to the consensus of opinion, the speed with which ITP removes the symptoms may mean that more people in future may probably carry its 8-tablet strip in their pocket than the number today moves about with other drugs.

We did not carry out sigmoidoscopy, of the cases receiving ITP and therefore, were not able to judge amoebic ulceration if any, and the amount of healing occurring with ITP therapy. The results of the treatment on the mucosa could not also be judged in these trials. However, improvement in the general condition of the patients after intake of the drug was encouraging.

The parasitological clearance in all cases investigated was evidence of prompt therapeutic action. *E. histolytica* cysts were not detected a month after treatment in 65.22 per cent cases traced. In 3 (23.1 per cent) males and 5 (50.0 per cent) females, the cysts were however, found continuously or intermittently in stool samples examined for 6 consecutive day's a month after ITP treatment.

After a course of ITP, the colon entamoebae were not detected in 55.56 per cent cases, but it persisted in others. The rate of eradication was 83.33 per cent in males, while it was not removed from two females having it together with *I. butschlii*.

71.43 per cent cases lost *I. butschlii* infection after ITP treatment. The drug, however failed to remove this parasite from 33.33 per cent males and 25.0 per cent females.

G. intestinalis infection was detected in three males. It was not detected a month after treatment in 66.66 per cent cases but persisted in 33.34 per cent cases. The therapeutic value of the drug is being verified on more cases.

The drug had not had any effect on helminthic infections. Freedom from these parasites whenever detected, however, was achieved with specific treatment which may not be discussed in this note.

So far we have not noticed any serious side effects during and after ITP therapy.

Suitable drug is a vague term. Who knows when an ideal drug may become unpopular. The reputation of a drug always traverses a parabolic curve. However, we have certain criterians to judge the merits. One wants a most effective and least toxic drug. Its administration should be simple both in quantity and extent. A cheap and easily available drug usually secures more marks. *Abe-hyat* is a well known "cure-all" but where from it is to be had, is not yet found for certain.

Chemotherapy of amoebic dysentery is one of our problems. Studies need to
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be carried out both on acutely ill and chronic sufferers. Symptomatic relief is not enough. Parasitological cure is very difficult to ascertain without subjecting the patient to sigmoidoscopy. In this work it is essential to enlist cooperation of parasitologists, clinicians, technicians and patients. Long range evaluation-procedures may provide answers.

The foreign firms are spending large part of their earnings on researches elsewhere, but in Pakistan only the Department of Promotion of Sale are properly maintained. There is also a great need of promotion of Research Programmes. On the spot observations will certainly provide new facts, however, small and give best support to the pharmaceutical claims. We wish to express our gratitude to Sandoz Pakistan Limited for the supply of Intestopan tablets for these trials. It is hoped that other pharmaceutical houses will be inspired by the fine example set in by this house.

Probably some one may suggest to the Pakistan Medical Research Council to take some appropriate action in this direction. A coordinated research project, if carried out in different teaching institutions under the supervision of specialists will provide us more reliable data.

In this work two important observations are involved. Symptoms are eliminated and the parasites are eradicated. For proper interpretation we need to extend our observation period to several weeks after the removal of the clinical symptoms and the parasites. Reappearance of the parasites during observation period may mean a relapse or re-infection. Serious attempts have to be made to differentiate between the two. While dealing with human beings, much may depend upon discretions. Faultless discretion should come after much discussion and debate. Avoid blunders and donot worry for errors. It is the virtue of ability to do the right when one would for it would change one knows not what. An opposite view has not served a useful purpose in the past and it would not also serve any useful purpose in future either. A coordination always serves the purpose to ones best advantage.

During the course of these trials, we distributed the drug to about 80-90 people. The follow-up studies however, could be made only on 23 cases. From our experience and conversation we had with our colleagues, we feel that we in the Public Health Section cannot carry out fact-finding trials without the help of a competent health-educator. We deal with two distinct groups of people. One group suffers from impressions while the other is intoxicated with fags. Literates are usually more difficult lots. They are like "awaking one who does not want to be awoken and poses to be asleep". The illiterates may be receptive but are superstitious. We did not attempt to be selective but had better luck when we worked in a community with low level of literacy.

We examined during 17th September community yield of chronic given Intestopan

(1) 65 reported excellent good, in 10 per cent. The symptoms

(2) Clinical examination,

(i) E. m

(ii) E

(iii) P

(iv) G

(v) A

(3) IT young and old

A few nauseated after

Head

Dry

A m

Palp

our months

7. Summary

Yet holds the eel of science by the tail.

(Pope).

We examined 554 males and 516 females from a village within Lahore Corporation during 17th September, 1963 to 31st August 1965. This brief coprological survey of the community yield 2.62 per cent cases of *E. histolytica*. The number of persons complaining of chronic and acute gastro-intestinal troubles was large. All these patients were given Intestopan at the rate of 2-3 tablets t.i.d. for 10 days.

(1) 65 per cent persons complaining of one or the other gastro-intestinal trouble reported excellent relief after the course of ITP. In 15 per cent the improvement was good, in 10 per cent it was moderate, while 5 per cent did not turn up to give any report. The symptoms could not be removed in five per cent.

(2) Clearance of protozoan parasites was studied in 23 cases. Coprological examination, after about a month of therapy which revealed the following position:—

- (i) *E. histolytica* cysts were not detected in 65.22 per cent cases. In 23.1 per cent males and 50 per cent females parasitological cure was not achieved.
- (ii) *E. coli* was got rid of in 55.56 per cent cases after an ITP course.
- (iii) Parasitological improvement also occurred in 71.43 per cent cases with *I. butschlii*.
- (iv) *G. intestinalis* was found in three cases. It was cleared in 66.66 per cent cases with a course of ITP.
- (v) All the cases with an helminthic infection were given a specific treatment.

(3) ITP is quick-acting product and has been generally well tolerated both by young and old patients.

A female, suffering from bronchial asthma, complained of vertigo and another nauseated after 4 days of medication.

Headache was the complaint of two women patients.

Dryness of mouth/tongue was experienced by two females and three males.

A male also complained of dizziness.

Palpitation of the heart increased in a female suffering from tuberculosis. She died four months after treatment.

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8. Acknowledgements

Others are fond of Fame, but Fame of you!

(Young)

We wish to express our gratitude to Dr. Nazir Ahmad, Dean, Institute of Hygiene and Preventive Medicine, Lahore, for providing us all facilities to carry out these clinical trials in the village Sahowary.

This report is based on preliminary data, not sufficiently enough to be analysed statistically. Gross omissions here and there warrant more trials. We hope to have benefit of Dr. Nazir Ahmad's expert advice on a project expected to be planned in the light of our present experience.

Our thanks are also due to Sandoz (Pakistan) Ltd., Karachi for the supply of intestopan tablets and providing copies of relevant published research papers.

9. References

Wearing all that weigh

Of learning lightly like a flower

(Tennyson)

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TABLE I
Summary of Complaints of 23 Cases referred to in the Reports

S. No.	Card No.	Age in years.	Abdominal pain, colic, tenesmus etc.	CHIEF COMPLAINTS (With Duration)					Remarks :	
				Stools : (Patients views)	Flatulence or Fullness of abdomen	Anorexia	Fever	Concomi- tent infec- tions		General Complaints
FEMALES (10 cases)										
1	48	4	Abdominal pain (5 mths.).	Loose stools, (usually diarrheal), with formed stools (constipation) often blood streaked (5 mths.)	Yes (5 mths.)	...	...	Passing round worms since one month.	...	i. <i>E. histolytica</i> , ii. <i>I. butschlii</i> and iii. <i>A. lumbricoides</i> . (Hookworm infection was detected a month after medication).
2	172	40	Abdominal pain (2 yrs.). Moderate tenesmus.	Frequently loose stools, alternating with constipation, often contaminated with blood streaked mucus (2 yrs.),	Yes (2 yrs.)	...	...	...	Feeling of weakness. Body pale- ness progre- ssing (12 yrs.).	i. <i>E. histolytica</i> , ii. <i>E. coli</i> and iii. <i>I. butschlii</i> . (Hookworm infection was detected a month after medication).
3	235	39	Abdominal pain (3 yrs.).	Diarrhoea, alternating with constipation, often contaminated with blood-streaked mucus (3 yrs.).	Flatulence (3 yrs.) Epigastric region fullness (6 mths.)	...	Occa- sion- ally (3 mths)	...	Breathless- ness, bout of cough with expec- toration. Dyspnoea, especially at night. (Since child- hood) Loss of sleep with anal irrita- tion at night (6 mths.).	i. <i>E. histolytica</i> and ii. <i>E. vermicularis</i> .

4	346	15	Abdominal pain (6 mths.)	Diarrhoea, with alternating constipation. Some times contaminated with mucus. No blood. (one yr.)	Flatulence (one yr.)	...	Passed round worms (2 mths.)	...	i. <i>E. histolytica</i> , ii. <i>I. butschlii</i> and iii. <i>A. lumbricoides</i> .
5	385	26	Abdominal pain (10 mths.)	Frequently loose stools, alternating with constipation. No blood or mucus in stools. (10 mths.)	...	Yes (2 mths.)	...	Pain in calf muscles (5-6 mths.)	i. <i>E. histolytica</i> .
6	427	40	Abdominal pain (3 yrs.)	Frequently loose stools, alternating with severe constipation. No mucus or blood in stools (3 yrs.)	Yes (3 yrs.)	Yes (2 yrs.)	...	Back ache and pain in legs (1 yr.)	i. <i>E. histolytica</i> .
7	453	25	Abdominal pain (1½ yrs.)	Loose stools, 4-5 daily (1½ yrs.)	Yes (1½ yrs.)	Yes (1 yr.)	...	Pains all over the body	i. <i>E. histolytica</i> , ii. <i>E. coli</i> and iii. <i>I. butschlii</i> .
8	457	8	Abdominal pain, tenesmus and colic (1 yr.)	Constipation (1 yr.) often blood streaked mucus in stools (6 mths.)	...	...	...	...	i. <i>E. histolytica</i> .
9	524	70	Abdominal pain (6 yrs.)	Often diarrhoea, alternating with severe constipation (6 yrs.)	Yes (6 yrs.)	Yes (3 yrs.)	Round worms often passed (6 yrs.)	Headache, pain in legs often (5 yrs.); cough with expectoration (3 yrs.)	i. <i>E. histolytica</i> , ii. <i>E. coli</i> and iii. <i>A. lumbricoides</i> . (Patient died 4 months after treatment).
10	642	22	Abdominal pain, tenesmus and colic (2 yrs.)	Loose stools, with blood streaked mucus (2 yrs.)	Yes (1 yr.)	Yes sometimes (2 yrs.)	...	...	i. <i>E. histolytica</i> .

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TABLE I—Continued.

TABLE I—Continued.										
S. No.	Card No.	Age in years.	Abdominal pain, colic, tenesmus etc.	CHIEF COMPLAINTS (with duration)						Remarks:
				Stools : (patients views)	Flatulence or fullness of abdomen	Anorexia	Fever	Concomitant infections	General Complaints	
Males (13 cases)										
11	219	36	Abdominal pain, dull (4 yrs.).	Diarrhoea, alternating with constipation (4 yrs.)	...	...	...	...	1. Burning sensation. 2. Pain in calf muscles at night since childhood. 3. Bad-cold very frequent since childhood.	i. <i>E. histolytica</i> and ii. <i>E. coli</i> .
12	304	10	Abdominal pain (1 yr.)	Loose stools, often with blood streaked mucus (1 yr.)	...	...	...	Passing round worms in stools since 6 months.	General body weakness.	i. <i>E. histolytica</i> and ii. <i>A. lumbricoides</i> .
13	305	8	Often Abdominal pain, and colic (6 mths.)	Frequently loose stools, with mucus. No blood. (6 mths.)	Yes, Golla formation (6 mths.)	...	...	Passing of round worms in stools (3 mths.)	General body weakness.	i. <i>E. histolytica</i> and ii. <i>A. lumbricoides</i> .
14	334	12	Pain all over abdomen, pericolic tenesmus and colic of rare and seldom tenesmus (6 mths.).	Loos stools, usually with much mucus. Sometimes with streaks of copious fluidus; No blood (6 mths.)	...	Yes (8 mths.)	...	Perianal irritation at night (4 mths.)	i. <i>E. histolytica</i> , ii. <i>E. coli</i> , iii. <i>G. intestinalis</i> , iv. <i>E. vermicularis</i> and v. <i>A. lumbricoides</i> and vi. <i>E. coli</i> .	
16	553	32	Abdominal pain. (2 yrs.)	Diarrhoea, alternating with constipation (2 yrs.)	Yes. (6 mths.)	...	...	General body weakness, pain in the legs (1 yr.)	i. <i>E. histolytica</i> , ii. <i>I. butschlii</i> , iii. <i>G. intestinalis</i> and iv. <i>A. duodenale</i> .	

15	382	8	Abdominal pain, seldom tenesmus (6 mths.).	Loose stools, with copious mucus. No blood (6 mths.)	Yes (6 mths.)	... times light fever	...	i. <i>E. histolytica</i> and ii. <i>E. coli</i> .
16	553	32	Abdominal pain. (2 yrs.)	Diarrhoea, alternating with constipation (2 yrs.)	Yes. (2 yrs.)	Yes (6 mths.)	...	i. <i>E. histolytica</i> , ii. <i>I. butschlii</i> , iii. <i>G. intestinalis</i> and iv. <i>A. duodenale</i> ,
17	640	19	Abdominal pain. (1 yr.)	Constipated stools (1 yr.).	Yes (1 yr.)	...	...	i. <i>E. histolytica</i> and ii. <i>I. butschlii</i> .
18	643	6	Abdominal pain. (6 mths.)	Diarrhoea, with alternating constipation, often with mucus. No blood (6 mths.)	Yes (6 mths.)	Yes (4 mths.)	...	i. <i>E. histolytica</i> and ii. <i>E. coli</i> .
19	670	17	Abdominal pain (6 mths.)	Diarrhoea, alternating with constipation. Some time blobs of mucus in stools. No blood (6 mths.)	Yes (4 mths.)	...	Thread worms passed in stools (1 yr.).	i. <i>E. histolytica</i> , ii. <i>E. coli</i> and iii. <i>E. vermicularis</i> .
20	702	30	...	Often constipated stools (1 yr.).	Yes (3 mths.)	...	...	i. <i>E. histolytica</i> .
21	739	43	Abdominal pain (4 yrs.).	Diarrhoea, alternating with constipation, often with mucus. No blood (4 yrs.).	Yes (4 yrs.)	Yes (1 yr.)	...	i. <i>E. histolytica</i> .
22	789	46	Abdominal pain (3 yrs.).	Diarrhoea, with alternating constipation. Sometimes with mucus. No blood. (3 yrs.).	Yes (3 yrs.)	Yes (1½ yrs.)	...	i. <i>E. histolytica</i> and ii. <i>A. duodenale</i>
23	910	60	Abdominal pain (2 yrs.)	Frequently constipated stools, (2 yrs.) and sometimes diarrhoea with blood streaked mucus.	Yes (2 yrs.)	Yes (1 yr.)	...	i. <i>E. histolytica</i> , ii. <i>E. coli</i> , iii. <i>I. butschlii</i> and iv. <i>G. intestinalis</i> .

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TABLE II
Summary of Clinical Investigations of 23 Cases referred to in the Report.

PRE-MEDICATION SYSTEMIC EXAMINATION												
Serial No.	Card No.	Age (Yrs.)	Physical Condition	Conjunctiva and Nails	Pulse per Minute	Temp. (°F)	Tongue	Oedema, etc.	PRE-MEDICATION SYSTEMIC EXAMINATION			
									Abdominal Examination	Chest Examination	Stool Examination	
FEMALES (Ten cases)												
1	48	4	Good,	Pink.	100	98.5	Coated white, moist.	...	i. Visible peristaltic movements. ii. Rt. iliac fossa tender.	Nothing abnormal detected.	i. <i>E. histolytica</i> . ii. <i>I. butschlii</i> & iii. <i>A. lumbricoides</i> .	
2	172	40	Bad, under-nourished.	Pale.	90	98.5	Furred, moist.	...	i. Epigastric region and right Hypochondrium tender. ii. Right and left iliac regions on deep palpation tender. iii. Caecum on palpation shows thickness.	Few, scattered Rhonci, bilateral.	i. <i>E. histolytica</i> . ii. <i>E. coli</i> and iii. <i>I. butschlii</i> .	
3	235	39	Weak built, Mal-nourished.	Slightly pink.	85	99.5	Coated white, moist.	...	i. Right Hypochondrium epigastric region and left iliac region tender. ii. Liver ++++, tender. iii. Spleen not palpable.	Scattered Rhonci all over chest.	i. <i>E. histolytica</i> and ii. <i>E. vermicularis</i> .	

4	346	15	Moderate built.	Slightly pink.	90	98.4	Coated white, moist.	...	iv. No mass palpated. i. Rt. and Lt. iliac region and Rt. hypochondrium and Epigastrium tender. ii. Liver (+), tender.	N.A.D.	i. <i>E. histolytica</i> , ii. <i>I. butschlii</i> and iii. <i>A. lumbricoides</i> .
5	385	26	Good.	Pink	82	98.0	Furred and moist.	...			i. <i>E. histolytica</i> .
6	472	40	Moderate	Pink.	80	98.0	Slightly coated white & moist.	...	i. Rt. iliac region and Rt. hypochondrium and Epigastrium tender. ii. Caecum thickened and palpable. iii. Liver (+), tender.	N.A.D.	i. <i>E. histolytica</i> .
7	453	25	Moderate.	Light pink.	86	98.5	Coated yellow and moist.	...	i. Hypogastric region tender. ii. Spleen not palpable. iii. Liver not palpable.	N.A.D.	i. <i>E. histolytica</i> , ii. <i>E. coli</i> and iii. <i>I. butschlii</i> .
8	457	8	Weak built.	Pale.	120	99.5	Furred and dry.	...	iv. Abdomen highly tympanic. i. Rt. hypochondrium and epigastric region tender. ii. Liver (+), tender. iii. Spleen not palpable.	N.A.D.	i. <i>E. histolytica</i> .

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TABLE II—Continued

Serial No.	Card No.	Age (Yrs.)	Physical Condition	Conjunctiva and Nails	Pulse per minute	Temp. (°F)	Tongue	Oedema, etc.	PRE-MEDICATION SYSTEMIC EXAMINATION		
									Abdominal Examination	Chest Examination	Stool Examination
9	524	70	Weak built, dehydrated and emaciated.	Pale	130	100.5	Furred and dry.	Oedema of feet and clubbing of fingers	i. Abdomen tender throughout. ii. Liver (++++), tender. iii. Spleen not palpable. iv. Caecum palpable, thickened. i. Rt. iliac region tender. ii. Caecum palpable and thickened. iii. Liver (+), tender.	i. Rhonci present all over, bilateral. ii. Rales at Rt. apex.	i. <i>E. histolytica</i> , ii. <i>E. coli</i> and iii. <i>A. lumbricoides</i> . (Patient died 4 months after treatment).
10	642	70	Weak built and under-nourished.	Light pink.	80	99.0	Moist and coated white.	...		N.A.D.	i. <i>E. histolytica</i> .
MALES (Thirteen Cases)											
11	219	36	Good.	Pink.	80	98.0	Clean and moist.	...	i. Rt. hypochondrium and epigastric region tender. ii. Liver palpable, tender, one finger. iii. Spleen not palpable.	N.A.D.	i. <i>E. histolytica</i> and ii. <i>E. coli</i>

12	304	10	Weak built	Light pink.	120	98.5	Coated yellow and moist.	...	Guarding of recti at the umbilical region and tenderness.	N.A.D.	i. <i>E. histolytica</i> and ii. <i>A. lumbricoides</i> . i. <i>E. histolytica</i> and ii. <i>A. lumbricoides</i> .
13	305	8	Weak built and ashen grey appearance.	Pale.	120	98.0	Coated yellow and moist.	...	i. Abdomen sunken. ii. Crepitus significant. iii. Rt. iliac region and the umbilical region tender.	N.A.D.	i. <i>E. histolytica</i> and ii. <i>A. lumbricoides</i> .
14	334	12	Weak built and pale look.	Pale.	130	98.0	Moist and slightly coated white.	...	i. Abdomen all over tender. ii. Spleen not palpable. iii. Liver not palpable.	Few Scattered Rhonci on both sides of chest. i. <i>E. histolytica</i> , ii. <i>E. coli</i> iii. <i>G. intestinalis</i> , vi. <i>E. vermicularis</i> and v. <i>A. duodenale</i> .	
15	382	8	Weak built.	Light pink.	110	99.0	Coated white and dry.	...	i. Left iliac region tender (pelvic region).	N.A.D.	i. <i>E. histolytica</i> and ii. <i>E. coli</i>
16	553	32	Good.	Pink.	80	98.4	Moist and coated white.	...	i. Abdomen all over tender. ii. Abdomen palpable.	N.A.D.	i. <i>E. histolytica</i> , ii. <i>I. butschlii</i> , iii. <i>G. intestinalis</i> and iv. <i>A. duodenale</i> .
17	640	19	Good.	Pink.	72	98.0	Moist and slightly coated white.	...	i. Rt. iliac region tender. ii. Caecum palpable.	N.A.D.	i. <i>E. histolytica</i> and ii. <i>I. butschlii</i> .
18	643	6	Moderate.	Light Pink.	110	98.4	Clean and moist.	...	i. Rt. Iliac region tender. ii. Liver not palpable. iii. Spleen not palpable.	N.A.D.	i. <i>E. histolytica</i> and ii. <i>E. coli</i> .

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TABLE II—Concluded

Serial No.	Card No.	Age (Yrs.)	Physical Con- dition	Conjunctiva and Nails.	Pulse per minutes.	Tem. (°F)	Tongue	Oedema, etc.	PRE-MEDICATION SYSTEMIC EXAMINATION		
									Abdominal Exami- nation	Chest Examination	Stool Examination
19	670	17	Good	Pink	72	98.4	Clean and moist.	...	i. Lt. Iliac region tender. ii. Pelvic colon palpable.	N.A.D.	i. <i>E. histolytica</i> , ii. <i>E. coli</i> and iii. <i>E. vermicu- laris</i>
20	702	30	Good	Pink	80	98.4	Clean and moist.	...	i. Abdomen not tender. ii. Liver not palp- able. iii. Spleen not pal- pable.	N.A.D.	i. <i>E. histolytica</i> .
21	739	43	Moderate	Light Pink.	90	99.0	Moist and coated white.	...	i. Rt. Iliac region tender. ii. Caecum palp- able and thick- ened. iii. Liver (++) tender.	N.A.D.	i. <i>E. histolytica</i> .
22	789	40	Moderate	Pale	90	98.4	Moist and coated white.	...	i. Rt. Iliac region tender. ii. Epigastric re- gion and right hypochoondrium tender. iii. Liver not palp- able. iv. Spleen not palp- able.	N.A.D.	i. <i>E. histolytica</i> , and ii. <i>A. duodenale</i> .
23	910	60	Weak built, mal- nourished.	Pale	100	98.5	Furred and dry	...	i. Lt. Iliac region tender. ii. Abdomen tym- panic.	N.A.D.	i. <i>E. histolytica</i> , ii. <i>E. coli</i> , iii. <i>I. butschlii</i> and iv. <i>G. intesti- nalis</i> .

TABLE III
Type of Parasitic Infections in 23 Cases with Respect to Sex.

Type of Infection	Single 6 <i>E. histolytica</i>	Double 8						Triple 6				Quadruple 2			Total with <i>E. histolytica</i>
		EC,	IB,	AD,	EV, AL,	EC, IB,	EC, EV, AL,	IB, AL,	IB, EC, AL,	IB, GI, AD,	EC, GI, AD, AV,				
1. MALE (10)	3	1	1	1	...	2	...	1	...	...	1	1	1	13	
Percentages	18.18														
EH, persisted	...	...	1	...	...	...	7.69	...	...	15.39	7.69	...	...	...	
Percentages	0.0													2	
2. FEMALE (10)	4	...	...	...	1	...	...	2	...	...	...	...	...	...	
Percentages	40.00													...	
EH, persisted	1	...	...	...	1	...	...	2	...	...	...	...	...	...	
Percentages	25.0													...	
3. TOTAL (23)	6	3	1	1	1	2	1	1	2	1	1	1	1	...	
Percentages	26.09													...	
EH, persisted	1	...	1	...	1	...	2	...	...	...	...	...	...	...	
Percentages	16.66													...	
EH, persisted	1	...	1	...	1	...	2	...	...	...	...	...	...	...	
Percentages	16.66													...	

Abbreviations:

EH: *E. histolytica*
AD: *A. dysenteriae*
IB: *I. bilis*
EC: *E. coli*
AL: *A. lumbricoides*
GI: *G. intestinalis*
AV: *A. verruca*

TABLE IV

Summary of treatment procedure and post medication observations of 23 cases referred to in the report

S. No.	C. No.	Age	Treatment	Side effects	Clinical Improvement	6 consecutive stool examinations a month after treatment						Remarks
						I	II	III	IV	V	VI	
FEMALES : (10 cases)												
1	48	4	(i) <i>Intestopan</i> (1 TDS for 10 days) together with. (ii) <i>Helmipar</i> (2 tablespoonfuls daily for four days).	Dryness of tongue	i. Rt. Iliac region not tender. ii. Regular movement bowels, stools formed. iii. Slight flatulence persisted. iv. Peristaltic movement not observed.	...	...	...	...	...	...	6 full-grown round worms passed after <i>Helmipar</i> .
2	172	40	(i) <i>Intestopan</i> (2 TDS for 10 days). (ii) <i>Alcopar</i> (5 gms).	...	i. Symptoms disappeared temporarily for a month and slowly reappeared thereafter. ii. Rt. and Lt. Iliac region still remained tender. iii. Caecum thick, palpable.	...	...	EH EC	EH	EH	EH	<i>Alcopar</i> administered after <i>Intestopan</i> . Became free of hook worm. <i>E. histolytica</i> remained playing a game of hide and seek.
3	235	39	(i) <i>Intestopan</i> (2 TDS, for 10 days). (ii) <i>Thymol</i> (10 gr., TDS, in gelatine capsules for 3 days).	Vertigo followed by fainting attacks for 7 days after treatment.	i. Flatulence corrected. ii. Rt. Iliac region not tender. iii. Epigastric region normal.	...	...	...	EH	EH	EH	(i) For chronic bronchitis and asthma used injection combiotic. (ii) <i>Thymol</i> for seat worm infection.

(iii) *Inj. Combiotic*
(1 gm. I/M for 2 weeks).

4	346	15	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	...	iv. Liver still (+++), tender.
			(ii) <i>Helminpar</i> (2 tablespoonfuls for 4 days).		v. Cough bout infrequent.
					vi. Rhonci in chest detected.
					vii. No complaints of pruritus ani.
				...	i. Rt. and Lt. Iliac region not tender.
				...	ii. Rt. hypochondriac region slightly tender.
				...	iii. Liver not palpable.
5	385	26	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	Nausea (but no vomiting) during last days after treatment.	i. Relieved of all signs and symptoms.
					ii. No constipation and no diarrhoea.
6	427	25	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	Dryness of mouth and headache.	i. No improvement in clinical conditions.
					ii. Rt. hypochondrium and Rt. Iliac region still tender.
					iii. Caecum thick and palpable.
					iv. Liver (+) and tender.
7	453	40	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	...	i. Slight relieve in abdominal pain.
					ii. Bowel movements regular, once a day.
					iii. Flatulence still present.

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TABLE IV—Continued,

S. No.	C. No.	Age	Treatment	Side effects	Clinical Improvement	6 consecutive stool examinations a month after treatment						Remarks
						I	II	III	IV	V	VI	
8	457	8	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	...	i. Relieved of all signs and symptoms. ii. Rt. hypochondrium and epigastric region not tender. iii. Liver not palpable.	...	...	...	...	...	...	Good response.
9	524	70	(i) <i>Intestopan</i> (2 T.D.S. for 10 days). (ii) <i>Helminpar</i> (2 tablespoonfull for 2 days).	Palpitation. Headache.	i. No abdominal pain. ii. Constipation persisted. iii. Flatulence not corrected. iv. Liver (++++), tender. v. Rhonci and crepts in the chest present still.	EH	EH	EH	EH	EH	EH	Remained -ve for round worms. EH persisted. The patient died 4 months after treatment.
10	642	22	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	...	i. No abdominal pain. ii. Bowels movements regular, once in the morning. iii. Stools formed. iv. Rt. Iliac region not tender. v. Caecum still thick. vi. Liver not palpable.	...	...	...	...	...	...	Good response.

MALES (13 cases)

11	219	36	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	...	i. Relieved of all signs and symptoms. ii. Liver not palpable. iii. Bowel movements regular, once in the morning.	...	...	...	...	A chronic case of bad cold, since childhood. Vit. A.D. improved his resistance power. He responded well to treatment.
12	304	10	(i) <i>Intestopan</i> (1 T.D.S. for 10 days). (ii) <i>Helmipar</i> (2 table spoonfuls for 4 days).	...	i. Pain in the umbilical region persisted. ii. Bowel movements regular. Stools, formed, without mucus.	...	...	...	...	<i>Helmipar</i> was combined to get rid of round worms.
13	305	8	(i) <i>Intestopan</i> (1 T.D.S. for 10 days). (ii) <i>Helmipar</i> (1 table spoonfuls for 4 days).	...	i. Flatulence markedly reduced. ii. No golla formation. iii. No tenderness. iv. Bowels move regularly, twice daily.	...	...	...	...	<i>Helmipar</i> was combined to remove round-worms.
14	334	12	(i) <i>Intestopan</i> (2 T.D.S. for 10 days) (ii) <i>Alcopar</i> (5 gm.) (iii) <i>Fersolate tablets</i> (1+1+1 for 6 days) (iv) <i>Phenobarbitone</i> ($\frac{1}{4}$ gr. on third day before administering <i>Alcopar</i>)	...	i. 2-3 unformed stools passed a day. ii. No mucus or blood. iii. Abdominal pain persisted. iv. Rt. Iliac region tender.	...	...	...	...	<i>Alcopar</i> along with <i>Intestopan</i> for hookworms 2-1/2 gm. of <i>Alcopar</i> was given for the first time it was vomited out. The dose was repeated next day but was vomited out again. He was given 1/2 gr. of Phenobarbitone before 5 gm. of <i>Alcopar</i> was administered. It was retained.

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TABLE IV—Continued.

S. No.	C. No.	Age	Treatment	Side effects	Clinical Improvement	6 consecutive stool examinations a month after treatment						Remarks
						I	II	III	IV	V	VI	
15	382	8	(i) <i>Intestopan</i> (1 T.D.S. for 10 days) (ii) <i>Antihistamine</i> (for 4 days) (iii) <i>Alkaline diuretic</i> (Mixture)	Allergic manifestation on 7th day of treatment. Oedema of feet and dryness of tongue on last two days of treatment. The patient had severe irritation all over the body, followed by eczematous dermatitis over the lower third of legs.	i. Formed stools passed twice daily. ii. No mucus or blood. iii. Lt. Iliac fossa not tender.	...	...	...	...	...	...	Antihistaminic treatment along with alkaline diuretic mixture to relieve him of allergic manifestations.
16	553	32	(i) <i>Intestopan</i> (2 T.D.S. for 10 days). (ii) <i>Alcopar</i> (5 gm.) (iii) <i>Resochin</i> (1+1+1 for 10 days).	...	i. No abdominal pain. ii. Constipation persisted. No diarrhoea. iii. Flatulence partially relieved.	IB	IB	IB	IB	IB	IB	Alcopar relieved of hookworm infection. Resochin was administered for giardiasis, which persisted after intestopan.
17	640	19	(i) <i>Intestopan</i> (2 T.D.S. for 10 days). (ii) <i>Repeated</i> (Thrice).	Dryness of mouth.	i. No abdominal pain. ii. Constipation persisted. iii. Flatulence partially relieved.	...	...	...	...	EH	EH	First course did not relieve the patient of <i>E. histolytica</i> . Second course also did not relieve of amoebiasis.

18	643	6	(i) <i>Intestopan</i> (1 T.D.S. for 10 days).	...	iv. Rt. Iliac region still tender. v. Caecum still thick and palpable.	After 3rd course the stool was negative for four days but became positive thereafter.
				...	i. No abdominal pain. ii. No flatulence. iii. Bowel movement more or less became regular. iv. Stools not contaminated with mucus. v. Rt. Iliac region not tender.	Good response.
19	670	17	(i) <i>Intestopan</i> (2 T.D.S. for 10 days). (ii) <i>Pulv, Thymol</i> (In gelatine capsules for 3 days).	...	i. Lt. Iliac region not tender. ii. Pelvic colon still thick and palpable. iii. Pruritus and relieved.	Thymol for seat-worm infection.
20	702	30	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	...	i. Asymptomatic case. ii. Flatulence relieved. iii. Constipation persisted.	Responded well.
21	739	43	(i) <i>Intestopan</i> (2 T.D.S. for 10 days).	...	i. Rt. Iliac region still slightly tender. ii. Caecum still thick and palpable. iii. Liver (++) tender. iv. Flatulence still persists. v. Bowel movement still irregular. vi. Abdominal pain relieved.	Infection still dormant. Symptoms persisted.

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TABLE IV—Concluded.

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S. No.	C. No.	Age	Treatment	Side effects	Clinical Improvement	6 consecutive stool examinations a month after treatment						Remarks
						II	IV	V	VI			
22	789	46	(i) <i>Intestopan</i> (2 T.D.S. for 10 days). (ii) <i>Alcopar</i> (5 gm.).	...	i. Flatulence still present. ii. Bowel movement still irregular, however, without mucus. iii. Abdominal pain relieved.	...	...	...	...	...	Symptoms did not improve well. The parasites, however, were got rid of.	
						EH	EH	EH	EH	EH		
						EC	EC	EC	EC	EC		
23	910	60	(i) <i>Intestopan</i> (2 T.D.S. for 10 days). (ii) <i>Resochin</i> (1+1+1 for 3 days).	(i) Dryness of mouth. (ii) Dizziness.	i. Intestopan did not give much relief. Most of the complaints persisted. ii. Slight relieve in abdominal pain. Resochin gave much relief. iii. Bowels became regular after a course of Resochin.	EH	EH	EH	EH	EH	All the parasites persisted except <i>G. intestinalis</i> which disappeared after Resochin treatment.	
						EC	EC	EC	EC	EC		
						IB	IB	IB	IB	IB		

TABLE V
Intestinal Parasitosis Before and After Treatment

Type of Cases	BEFORE TREATMENT				AFTER TREATMENT		
	Parasites involved	Number		Parasites involved	Number		
		Male	Female		Male	Female	
1. Single infections (6 cases)	i. <i>E. histolytica</i>	2	4	<i>E. histolytica</i>	...	1	
2. Double infections (8 cases)	i. <i>E. histolytica</i> and <i>E. coli</i>	3	...	...	...	...	
	ii. <i>E. histolytica</i> and <i>I. butschlii</i>	1	...	<i>E. histolytica</i>	1	...	
	iii. <i>E. histolytica</i> and <i>A. duodenale</i>	1	...	...	...	...	
	iv. <i>E. histolytica</i> and <i>E. vermicularis</i>	...	1	<i>E. histolytica</i>	...	1	
	v. <i>E. histolytica</i> and <i>A. lumbricoides</i>	2	...	...	...	...	
3. Triple infections (6 cases)	i. <i>E. histolytica</i> , <i>E. coli</i> and <i>I. butschlii</i> .	...	2	i. <i>E. histolytica</i> <i>E. coli</i> and <i>I. butschlii</i> .	...	1	
	ii. <i>E. histolytica</i> , <i>E. coli</i> and <i>E. vermicularis</i> .	1	...	ii. <i>E. histolytica</i> , <i>E. coli</i> and <i>A. duodenale</i> .	...	...	
	iii. <i>E. histolytica</i> , <i>E. coli</i> and <i>A. lumbricoides</i> .	...	1	<i>E. histolytica</i> and <i>E. coli</i> . (Patient died 4 months after treatment).	...	1	

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TABLE V—Concluded.

Type of Cases	BEFORE TREATMENT		AFTER TREATMENT		
	Parasites involved	Number	Parasites involved	Number	
				Male	Female
4. Quadruple infections (2 cases)	iv. <i>E. histolytica</i> , <i>I. butschlii</i> and <i>A. lumbricoides</i> .	...	...	...	...
	i. <i>E. histolytica</i> , <i>E. coli</i> , <i>I. butschlii</i> and <i>G. intestinalis</i> .	1	<i>E. histolytica</i> , <i>E. coli</i> , <i>I. butschlii</i> and <i>G. intestinalis</i>	1	...
	ii. <i>E. histolytica</i> , <i>I. butschlii</i> , <i>G. intestinalis</i> and <i>A. lumbricoides</i> .	1	...	...	...
	i. <i>E. histolytica</i> , <i>E. coli</i> <i>G. intestinalis</i> , <i>E. vermicularis</i> and <i>A. lumbricoides</i> .	1	<i>E. histolytica</i> .	1	...
6. Total Infections (23 cases)	PROTOZOAS : <i>E. histolytica</i> 23 <i>E. coli</i> 9 <i>I. butschlii</i> 7 <i>G. intestinalis</i> 3 HELMINTHS : <i>A. duodenale</i> 1 <i>E. vermicularis</i> 3 <i>A. lumbricoides</i> 7	13 6 3 3 1 2 4	<i>E. histolytica</i> 8 <i>E. coli</i> 4 <i>I. butschlii</i> 2 <i>G. intestinalis</i> 1	3 1 1 1	5 3 1 ...

ITP has no therapeutic action on helminthic infections. Specific treatment was therefore, given to patients having hookworm and roundworm infections in addition to amoebiasis. *E. histolytica* co-existed in 10 cases with helminths. It was successfully removed from 7 cases.