Evaluation of Directly Observed Treatment Short Course(DOTS) Program Implementation in Al-Anbar Governorate ,West of Iraq, for the Years 2008-2012

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Abstract:

Background:- DOTS program has been adopted by WHO as hopeful strategy for treatment of TB since early nineties ,and it is widely accepted as an essential strategy for achieving (TB) control . Iraqi health authorities started DOTS program implementation since 2001 in Baghdad, Iraq.

Objectives:- This study aimed to evaluate DOTS program implementation in Al-Anbar Governorate from 2008-2012 , and to assess the treatment outcomes of this program .

Patients and Methods:- This Cross –Sectional Descriptive Study was conducted in consultation clinic in Ramadi city ,Al-Anbar Governorate for the period of October 1 ,2012 to March 31,2013 . Records of (1680) TB patients were studied retrospectively for the years 2008 to 2012 .Data regarding pulmonary cases for positive and negative smears ,extra-pulmonary and relapse cases ,treatment failure and chronic cases , in addition to Socio - demographic features were obtained .Statistical package for social sciences (SPSS)version 17 , and chi- square test were used ,while P values of less than 0.05 considered statistically significant .

Results:- A total of 1680 TB patients records reviewed , (919) were males , and (761) were females . Male to female ratio was 1.2:1 .The total of new sputum smear positive(SS+) cases were 541(32.2%),sputum smear negative(SS-)
were 413(24.5%) ,and extra pulmonary(EP) cases were 726(43.2%) .The Cure rate for TB patients for the period (2008- 2012) was 84.7% , 86.8%, 82.7% ,85.6% ,and 91.4% respectively . The treatment success rate of DOTS program for the period from 2008 to -2012 were 89% , 85.6% , 85.6% ,85.8% , 87.7% respectively .The higher death rate was at 2010 (4.5%) ,treatment failure rate was higher at 2012(2.6%) ,while defaulter rate was higher at 2009(10.5%),and transfer out rate was higher at 2010 (1.9%) .

Conclusions:- DOTS program is still an important role in improving registration and curing TB cases ,and widely accepted for achieving TB control strategy in AL-Anbar Governorate .Although many results were close to WHO targets ,the case detection rate was very low and faraway from its goals .

Keywords: DOTS, TB, Cure rate, Defaulter rate, Transfer out rate.

Introduction:

Tuberculosis (TB) is an infectious disease and is a major global health problem .Each year, there are around nine million new cases of TB , and close to two million people that die from TB [(1)] .

In spite of a major advances in diagnosis, treatment and prevention of (TB) , the disease still constitutes a major health problem throughout the world. About one third of the world's population is infected by Mycobacterium Tuberculosis. Deaths from TB comprise 25% of all avoidable deaths in developing countries and 75% of these deaths are in the economically productive age group (15 -59 years) ,and thus TB has huge economic, social and familial repercussions [(2)] .

World Health Assembly (WHA) recognized TB as a major global public health problem. Two targets for TB control were established, 1- detection of 70% of new smear positive cases and 2- cure of 85% of such cases by the year 2000 which deferred later to 2005. In 1994, the internationally recommended control strategy, later named directly observed therapy-short course (DOTS), was launched. In Iraq by 2006, new smear-positive TB cases had reached 46% and treatment success rate 87% [(3)].

The world health organization (WHO) is working dramatically to reduce the burden of TB, and halve TB deaths and prevalence by 2015 compared with 1990 and to eliminate the disease (<1 case per
million population) by 2050 through its Stop TB Strategy that includes expanding access to diagnosis and treatment through approaches engaging all care providers in DOTS implementation [(4)]. One of these approaches is the Public–Private Mix approach [(5)]. DOTS refers to a method of treatment of TB in which each prescribed dose of medication is taken under observation of a supervising person ,usually but not necessary a health professional [(6)] .

The DOTS strategy has four key technical pillars 1- detection of smear-positive pulmonary tuberculosis using sputum microscopy ,in patients presenting themselves to public clinics 2-directly observed treatment with short-course chemotherapy 3- guaranteed continuous drug supply, 4- and a case recording system tracking treatment outcomes ,however the four technical pillars of DOTS remain the cornerstone of the revised approach [(7)] .

WHO has evaluated the performance of DOTS in the course of specific studies [(8,9)] as well as detailed annual reports since 1997 [(4,7,10)].These publications make use of two major indicators of program performance ;treatment results among patient cohorts and percent of incident TB cases detected by national programs .

Aims of the study:

The aims of this study were to:

1-Evaluate the DOTS program implementation in Anbar governorate for the years 2008- 2012.
2- Assess the outcomes of DOTS therapy according to (WHO) standardized definition.

Patients and Methods:-

This Cross-sectional health care records-based study was conducted in consultation clinic for chest and respiratory diseases in Al- Ramadi city which is responsible for diagnosis and treatment of patients with respiratory symptoms in addition to TB cases in Al-Anbar Governorate . All tuberculosis patients registered in national TB control program at consultation clinic for chest and respiratory diseases in Al-Ramadi city for the period 2008-2012 were enrolled in this study.
Data of socio-demographic features and clinical characteristics that records for these TB Patients were collected from October 1, 2012 to March 31, 2013.

Tools of evaluation:

1: - Review of quarter reports:
Recording information:
- Socio-demographic features: Name, age, gender, residency, marital status, monthly income, date of start treatment and occupation.
Clinical characteristics : site (pulmonary or Extra pulmonary(EP) , classification (Category I (patients with a high priority for treatment who are new smear positive ,new smear negative pulmonary TB and sever forms of extra-pulmonary TB.) , or Category II (patients with re-treatment cases (relapse, treatment failure and defaulters).
- Laboratory findings: sputum smear microscopy: a sputum smear positive and sputum smear negative results other than pulmonary TB.
Treatment results (Treatment outcomes): Cured, Treatment completion, Failure, Default, Died and Transfer out.
2:- Supervision of visitor reports: According to TB Annual Report in Iraq, the reported levels of governorate in (CDR, Treatment success rate and Sputum conversion rate were obtained .

Evaluation indicators include:-

A- Case finding indicator: Assessment of case detection rate (CDR) in DOTS Program implementation ,this taken from recording and reporting at Al-Anbar national tuberculosis control program(NTP).
B – Sputum smear conversion indicator: Assessment of sputum smear conversion rate in DOTS Program implementation.
C- Treatment outcomes indicator: Assessment of treatment outcomes (Treatment results) for the same period in the implementation of DOTS Program.

Standardized definition of treatment outcomes according to WHO Report 2012 [(11)] :
The outcomes assessment was done according to WHO standardized definitions of treatment outcomes:

1-cured: A patient who was initially sputum smear positive and who was sputum smear-negative in the last month of treatment and on at least one previous occasion.
2-completed treatment:-A patient who completed treatment but did not meet the criteria for cure or failure .This definition applies to sputum smear positive and sputum smear negative patients with pulmonary TB and to patients with extra pulmonary disease.
3-successfully treated:-A patient who was cured or who completed treatment.
4-Relapse: a patient who previously received treatment and was declared cured and has once again developed sputum smear positive
5-Treatment failure: A patient who was initially sputum smear-positive and who remained sputum smear-positive at month 5 or later during treatment.
6- Defaulted (return after interruption of treatment) a new patient who completed at least one month of treatment and return after at least two months of interruption or a patient whose treatment was interrupted for 2 consecutive months or more.
7-Transfer out: - a patient already registered for treatment in one governorate that transfers to another one where he\she continue treatment.
8-chronic case;-a patient who remains sputum positive after completing a supervised re treatment regimens (6-8 months)
9-Died case: A patient who died for any reason during the course of treatment.
10-Not evaluated:-A patient whose treatment outcomes is not known.

The Research Ethical Approval Committee of the Medical College, AL-Anbar University, Iraq, approved this study.

Statistics :- Statistical package for social sciences (SPSS)version 17 , and chi- square test were used ,while P values of less than 0.05 considered statistically significant .

Results

A total of 1680 reviewed records for TB patients in consultation clinic for chest and respiratory diseases in Ramadi city for period 2008-2012 revealed that 352 (20.9%) of TB cases were in 2008, 361(21.5%) of TB cases in 2009, 355(21.2%) of TB cases in 2010, 313(18.6%) of TB cases in 2011 and 299 (17.8%) of TB cases in 2012 . The most prevalent age group was 15-44 years (61%), lower frequency of age group ≥ 65 years (11.3%). There was a statistically significant association between young-middle age and TB cases in years (p=0.04) table 1.
The males 919 (54.7%) were more than females 761(45.3%), male to female ratio was 1.2:1, there was a significant association between male gender and TB cases in years (p=0.03). In the last two years the females predominated on males, table 2.

There was a significant decrease in total TB cases in last two years (p <0.001), the total new sputum smear positive(SS+) cases was 541 (32.1%), total new sputum smear negative(SS-) was 413 (24.5%) cases and total new extra-pulmonary(EP)cases was 726 (43.3%) cases for period 2008-2012.

The sputum smear positive (SS+) cases were 108, 111, 101, 131 and 90 for period 2008-2012 and the sputum smear negative(SS-) cases were 101, 106, 87, 52 and 67 for period 2008-2012, while the extra-pulmonary(EP) cases for the same period were 143,144,167,130 and142.There was no decrease in EP cases in the last 5 years, table 3.

The success rates of treatment of the DOTS program in Anbar for period 2008-2012 were 89%, 85.6%, 85.6%, 85.8% and 87.7%, respectively, table 4.

The cure rate for TB patients in Anbar for the period 2008-2012 were 84.7%, 86.8%, 82.7%, 85.6% and 89.7%, respectively, the treatment completion rate of TB patients in 2008 was 94%, 2009 (85.8%), 2010 (87.0%), 2011 (86.5%) and 2012 (84%). The case fatility rate was an indicator for evaluation of DOTS program implementation which was ranged from(0.56-4.5%) for that period, while the higher cause specific death rate was at 2009 1.1/100000 populations and the lower cause specific death rate was at 2008 0.14/100000 pop. Treatment failure was higher at 2012 (2.6%) and defaulter rate was higher at 2009 (10.5%). Transferee out rate was higher at 2010 (1.9%), table

Table 1: Distribution of TB cases according to age groups for period 2008-2012, Al-Anbar governorate.

Years	Age groups (years)								Total	
	≤ 14		15-44		45-64		≥ 65			
	N	%	N	%	N	%	N	%	N	%
2008	44	12.5	216	61.4	55	15.6	37	10.5	352	100.0
2009	41	11.4	221	61.2	55	15.2	44	12.2	361	100.0
2010	34	9.6	212	59.7	75	21.1	34	9.6	355	100.0
2011	36	11.5	208	66.5	39	12.5	30	9.6	313	100.0
2012	44	14.7	167	55.9	43	14.4	45	15.1	299	100.0
Total	**199**	**11.8**	**1024**	**61.0**	**267**	**15.9**	**190**	**11.3**	**1680**	**100.0**
$\chi^2 = 21.5$ P= 0.04										

Table 2: Distribution of TB cases for period 2008-2012 according to gender, Al-Anbar governorate.

Years	Gender				Total	
	Male		Female			
	N	%	N	%	N	%
2008	200	56.8	152	43.2	352	100.0
2009	211	58.4	150	41.6	361	100.0
2010	205	57.7	150	42.3	355	100.0
2011	155	49.5	158	50.5	313	100.0
2012	148	49.5	151	50.5	299	100.0
Total	**919**	**54.7**	**761**	**45.3**	**1680**	**100.0**
$\chi^2 = 10.6$ P = 0.03						

Table 3. Frequency of TB cases by type of TB Anbar governorate during the period (2008-12)

Year	SS+		SS-		EP		Total		χ^2, P-value
	N	%	N	%	N	%	N	%	
2008	108	30.7	101	28.7	143	40.6	352	100.0	28.9 **< 0.001**
2009	111	31.0	106	29.4	144	39.6	361	100.0	
2010	101	28.5	87	24.5	167	47.0	355	100.0	
2011	131	41.2	52	16.6	130	42.2	313	100.0	
2012	90	30.1	67	22.4	142	47.5	299	100.0	
Total	541	32.1	413	24.5	726	43.3	1680	100.0	

Table 4. Treatment outcome rates for TB patients in Anbar governate

Year	Cure rate %	Treatment completion(T.C.) rate%	Success rate %	Case fatality rate %	Cause specific death rate/ 100000	Treatment failure rate %	Defaulter rate %	Transferee rate %
2008	85.0	94.0	89.0	0.56	0.14	1.1	8.2	0.5
2009	86.8	85.8	85.6	4.4	1.10	0.27	10.5	0.27
2010	82.8	87.0	85.6	4.5	1.05	0.84	5.6	2.2
2011	85.5	86.5	85.8	3.5	0.70	0.95	6.3	1.9
2012	89.7	84.3	87.7	4.0	0.74	1.6	7.3	2.3
Mean	86.3	87.5	86.7	3.38	0.74	0.95	7.5	1.4

The total patients converted to SS- were 89, 91, 75, 106 and 66 for the years 2008, 2009, 2010, 2011 and 2012, respectively. The conversion rates of patients with SS+ for the years 2008, 2009, 2010, 2011 and 2012 were 84%, 92%, 88%, 94.6% and 90%, respectively, table 5.

The targets of case detection rates (CDR) for TB cases in Al-Anbar were 43%, 50%, 55%, 60% and 65% for years 2008, 2009, 2010, 2011 and 2012, respectively, according to Iraqi MOH, table 6.

The CDRs for SS+ cases in years 2008, 2009, 2010, 2011, 2012 were 25.48%, 25.06%, 22.89%, 30.25% and 27.08%, respectively, and the population number calculated according to Al-Anbar statistics, table 6.

There was no significant association between seasonal variation and number of TB patients in Anbar governorate for period 2008-2012,table 7.

The higher proportion of the TB patients (36.6%) were referred to TB units by public health centres, 27.4% of the patients were referred by themselves, 25.2% of the patients were referred by private sectors, 8.5% of the patients were referred by community activities and 2.3% referred by others e.g. prisons(figure 1).

Table 5. Sputum conversion of (new ss+) cases registered in Al-Anbar during years 2008-12.

Year	Recorded new(ss+) cases in quarter ago	Examined new(ss+) from recorded	No. of cases converted to smear negative			
			Second month	Third month	Total no.	Conversion rate
2008	108	106	79	10	89	84%
2009	99	99	84	7	91	92%
2010	86	85	72	3	75	88%
2011	115	112	97	9	106	94.6%
2012	78	73	64	2	6	90%
						Mean 89.7%

Table 6. Case detection rate (CDR) in AL-Anbar governorate from 2008 -2012

Years	N0. Of population Anbar statistic	Target of WHO 56/100000	Target which occur	Target for ss+ 25/100000	SS positive C.D.R	SS negative	Relapse	Extra-pulmonary
2008 43%	1.446104	810	352	361	92 **25.48%**	101	16	143
2009 50%	1.451583	813	361	363	91 **25.06%**	106	20	144
2010 55%	1.521652	852	355	380	87 **22.89%**	87	10	167
2011 60%	1.561407	874	313	390	118 **30.25%**	52	10	130
2012 65%	1.602637	721 45/100000	299	288 18/100000	78 **27.08%**	67	12	142

Mean case detection rate= 26.15%

Table 7. Distribution of TB patients according to seasonal variation.

Quarter	2008		2009		2010		2011		2012		Total		χ^2	P
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
1st quarter (winter)	96	21.9	98	22.3	88	20.0	80	18.3	76	17.5	438	100.0	17.0	0.14
2nd quarter (spring)	117	22.8	117	22.8	92	17.9	95	18.6	86	16.8	513	100.0		
3rd quarter (summer)	84	21.5	77	19.7	81	20.7	78	19.9	71	18.2	391	100.0		
4th quarter (Autumn)	55	16.0	69	20.0	94	27.3	60	17.4	66	19.3	344	100.0		
Total	352	20.9	361	21.5	355	21.1	313	18.6	299	17.9	1680	100.0		

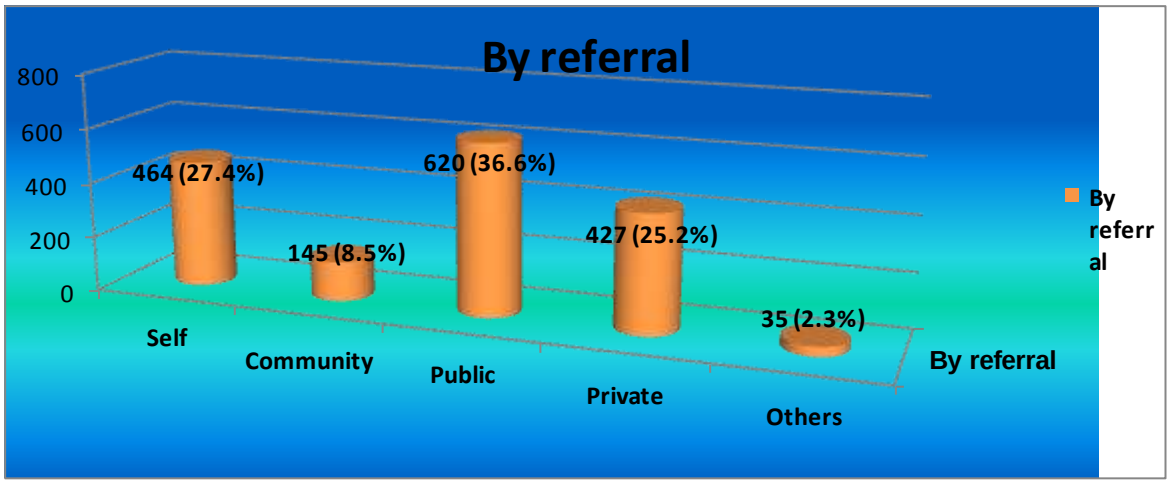

Figure (1) . Types of referral of TB patients in Al-Anbar for the period 2008-2012.

Discussion

Tuberculosis (TB) is a global epidemic with over 2 billion people, equal to one-third of the world's population, are currently estimated to be infected, with 9.4 million new TB cases identified worldwide and 1.8 million deaths annually. Despite the enormity of the issue and constant effort of World Health Organization (WHO), understanding and awareness on many aspects of TB, among the general public as well as many health care professionals, remains hesitant. Surveys carried out worldwide assessing not only the knowledge, but also attitude and practices of health care workers, have identified calamitous deficiencies warranting a well coordinated global effort in order to achieve WHO stop TB partnership targets [12] .

The records review of the present study revealed a significant association between young-middle patients (age 15-44 years) and TB involvement ($p = 0.04$),followed by age group of (45-64) , and the lowest age group was ≥ 65 years, indicating that TB was more prevalent among active age patients and middle age groups of patients had higher risk of TB. Several possible factors were suggested to contribute to this situation as diverse exposures to *Mycobacterium tuberculosis* result from more social participation and occupation hazards in this age group [13] .These findings were consistent with results of Marzouk study in Baghdad, in which 377 (78%) of TB patients interviewed ,and the most prevalent age group was 15-24 years [14] ,while this finding of the present study regarding younger age group was inconsistent with results of Kolifarhood G, et al study in Iran, that reported higher incidence of TB with older age TB patients [15] .

Male gender patients were significantly predominated among TB cases ($p = 0.03$), and this finding agreed with results of other study in Iraq [16] . The observed differences in gender distribution in tuberculosis could be attributed to racial, genetic, or socio -cultural factors. It could be also attributed to the fact that women have less access to diagnostic facilities in some settings [17] . TB cases detection were much lower in women than men due to many causes , women are too afraid to say they want to go to a TB clinic, due to potential rejection. Females in present study were more than males in the last two years and this is consistent with results of Kolifarhood G, et al study in Iran [15],that might be attributed to cultural and social stigma [18].

National tuberculosis control program (NTP) in Iraq announced that 78.9% of new sputum smear

positive(SS+) TB cases were between 15-54 years, 61% of them were males [19] which is more or less similar to age and gender distribution of most regional countries declared by WHO [11] .

There was a significant decrease in sputum smear positive (SS+) and sputum smear negative (SS-) TB cases in Al-Anbar in the last year ($p < 0.001$), that agreed with WHO reports regarding decrease in TB incidence in last year's [11], on the other hand, there was no significant changes in extra pulmonary (EP) cases in the last five years. The extra pulmonary (EP) tuberculosis cases fluctuated and did not change significantly during the period 2008-2012. The total new sputum smear positive (SS+) cases represented 32.1% of all TB cases, sputum smear negative (SS-) cases represented 24.5% of all TB cases , and extra pulmonary(EP) represented 43.3% of total TB cases for the period 2008-2012.

These findings indicated an increase in extra-pulmonary TB cases which were higher than that reported in USA at (2006) as (18.7%), and in South Africa (2006) as 16%. The finding with high prevalence of extra pulmonary (EP)TB cases might be attributed to late in diagnosis of pulmonary tuberculosis(PTB) cases in early stage until disseminate to extra pulmonary tuberculosis (EP) TB, over diagnosis of extra pulmonary tuberculosis(EP) TB, weaning of BCG vaccine which increase burden of TB meningitis , and some diseases or conditions contributed to increase (EP)TB (diabetes, immunosuppressed drugs ,HIV) Globally. The causes of high prevalence for extra pulmonary tuberculosis(EP) TB were contributing to factors like deterioration of tuberculosis public health infrastructures , the human immunodeficiency virus (HIV)/AIDS epidemic, increased immigration from countries endemic for tuberculosis, and tuberculosis transmission in congregate settings USA [20,21] .

According to the global plan to stop TB 2006-2015, when launched in January 2006, one of the specific target (according to the major component of the plan) the case detection rate (CDR) of 84% (for all cases and smear positive cases specifically) and a treatment success rate of 87% by 2015. The Project in Iraq aimed at increasing case detection from 20% to 30% in two years, while maintaining treatment success at 85%. Although this was subjected to drastic improvement in the security situation in Iraq, the Project also aims at reaching 70% case detection in 5 years, and 87% treatment success rate [19] .

The present study reported that , the cure rate for TB patients in Al-Anbar in 2008 was 85% , which was borderline with the target for cure rate in Iraq (more than 85%) as reported by Iraqi NTP [19] . In 2009 the cure rate of (86.8%) and in 2011 the cure rate of (85.5%) were compatible with the target (> 85%). The cure rate at 2012 (evaluation for six months only) was (91%) ,while at 2010 was (82.8%). This fluctuation in cure rate might be attributed to increased defaulted TB patients caused by irritable security condition in Iraq that had a destructive effect on DOTs program. In 2008, the cure rate of (85%) was higher than that reported in reported in Karbala province (82%), Salah-Aldin province (81%), Wasit province (81%), Babil province (78%), Najaf province (78%), Erbil province (76%) and Baghdad the capital (62%), although this cure rate was lower than that reported in Ninawa province (97%), Thi-Qar province (92%), Muthenna province (92%), Kirkuk province (91%), Sulaymania province (90%), Misan province (89%), Diyala province (88%), Dohuk province (88%), Diwanyiah province (86%) and Basrah province (86%) in Iraq [3]. The cure rate in 2008 of (85%),which was higher than that reported in Africa (75%) [22] . The cure rate reported by present study was (91%) in 2012 , which was closer to that reported in China (more than 90%) [23] .

The mean success rate of TB treatment in Anbar for period 2008-2012 was 86.7% , that was closer to Iraq national tuberculosis control program (NTP) and WHO goal of 87% at 2015 [11,19] . The success rate was higher at 2008 (89%) and was higher than that reported in Basrah province (88%), Dohuk province (88%), Karbala province (86%), Baghdad the capital (80%) and Babil province (79%) in Iraq but lower than that reported in Ninawa province (97%), Salah-Aldin province (94%), Sulaymania province (93%), Thi-Qar province (92%), Muthenna province (92%), Misan province (91%), Diwanyiah province (91%), Diyala province (91%), and Erbil province (91%) in Iraq [3]. In 2012 the low success rate was due to short period of treatment evaluation in 2012 (only 6 months).

The success rates observed by present study in Al-Anbar for period 2008-2012 are higher than success rate observed in Africa in 2002, that was 80% [4] and close to that reported in Egypt in (2000), as 85% [24], and Iran in 2008, as 85.27% [25]. The success rate of (86.7%) was higher than that reported by Ahmed Suleiman MM and his colleagues in Sudan (2009) as (73.5 %) [26], and a success rate reported in South Africa as (71%) in 2005 [4] .

The case fatality rate in Anbar governorate for the period 2008-2012 was ranged between 0.56% to 4.5%(mean 3.38%) which was within WHO targets [1,27] while cause specific death rate of TB Patients in Anbar for period 2008-2012 ranged between 0.14-1.1/100000 population (mean 0.74) , that was lower than reported by WHO as in Iraq (2007), as 11/100000 [3]. The reported cause specific death rate in Anbar in 2008 by the present study as 0.14/100000 is lower than that reported in Iraq in 2008 as 16/100000 [3] . The higher cause specific death observed in Anbar was at 2009 as 1.1/100000 pop. That was lower than TB cause specific death rates in high-burden countries, in Brazil 9/100000 ,and in South Africa 139 /100000. [28] .

The mean treatment completion rate was far from the target (95%) reported in Iraqi NTP [19] . The higher

treatment completion rate in Al-Anbar was at 2008 as 94% which was higher than that reported in Iran (2009) as 76% of TB patient, who took the treatment were completed it [29] . The lowest treatment completion rate was at 2012 as 84.3% , that might be due to 6 month of evaluation of the patients and treatment outcome during 2012. This rate of 95% is higher than that reported in China (70%) in 2002 [30] .

The mean of transferee out rate in Al-Anbar for period 2008-2012 was 1.1%. A higher rate of transferee was observed in 1.9 that was lower than that reported from other provinces in Iraq especially in Ninawa in 2007 as 13.7%, which caused by multiple factors as civilian war, internal displacement and economical changes occurred in Iraq after 2003 [31] .

The mean of treatment failure rate of TB patients in Al-Anbar for period 2008-2012 was 1.15% which was higher than that reported as better indicator for TB treatment by WHO as < 5% [1] . The treatment failure rate in 2008 was 1.1% which was lower than that reported in Iraq in 2008 as 5.6% that was the percentage of multi-drug resistance among TB cases [3] .

The reported failure of TB treatment in Al-Anbar for this period was lower than that reported by Ahmed Suleiman MM and his colleague's study in Al-Khartoum (Sudan) at 2009 ,which was 2.2% [26] .

This study showed an overall default rate among the TB patients of 7.8%. This was higher than the WHO recommended rate of 3% [32]. Several studies had reported similarly high default rate in African population [29,33,34] .This might indicate that much health education still needed to be done at the primary health care (PHC) centers and the community to sensitize the community members on the need for treatment adherence in the management of TB and other chronic illnesses. The defaulter rate in the present study was lower than that reported in Sudan as 14.1% [26] .

Rate of default was higher among patients with extra-pulmonary TB, followed by patients with pulmonary TB sputum smear positive (SS+) in this study .This was similar to some studies which demonstrated similarly higher default rate in extra pulmonary(EP) group compared to the group with pulmonary tuberculosis(PTB) with smear positive microscopy[35] . However, patients with smear-positive pulmonary tuberculosis (PTB) are more likely to complete treatment, possibly because their illness was more severe and symptomatic[36,37].

The mean sputum conversion rate for treated TB patients after 3 months of treatment in Al-Anbar for period 2008-2012 was 89.7% , that was higher than what had been declared by national tuberculosis control program(NTP) in Iraq (79 %) during 2007 [19] ,these results were nearly met the WHO requirement of achieving 85% sputum conversion rate after 2 months of chemotherapy[5].

The sputum conversion rate in the present study was close to results of Marzouk study 86.5% [14] and Ameen study 89.3% [38] in Iraq. A higher sputum conversion rates were reported in Al-Anbar in the last five years as compared to other provinces in Iraq [3] .

Mean case detection rate of new sputum smear positive (SS+) TB cases in Al-Anbar for period 2008-2012 was 26.16% that was far away from the target for each year declared by Iraqi national tuberculosis control program (NTP) (43%- 65%) [19] and from WHO goal (70%) ,(WHO report 2008). The case detection rate was 25.48% in 2008, 25.06% in 2009, dropped down in 2010 to reach 22.89% and rise up in 2011 to reach 30.25%, in 2012 the cases detection rate was 27.08%.

The case detection rate in 2008 of 25.48 in Al-Anbar, which was lower than recorded in other provinces of Iraq as in Babil 89%, Diwanyiah 78%, Thi-Qar 64%, Wasit 63% and Baghdad 57% , and only higher than Dohuk (25%), Ninawa (21%), Salah-Aldin (18%) and Erbil (16%) provinces of Iraq[3].

The case detection rates for the period 2008-2012 in the present study were far away from that was estimated in China as (53%) [23] , and was far away from cases detection rate for new SS+ TB cases calculated in study in Al-Khartoum (Sudan) at 2009, that was 77.2% [26] .

Unfortunately, the cases detection rates in Al-Anbar for this period were lower than cases detection rate observed in Somalia , which was 68% in 2004 [39] , Although this country was declared by Union Nation (UN) as disastrous country (under civilian war).

In Syria (geographical neighbor), the reported cases detection rate in 2006 was 46% (WHO, 2006) and in Egypt (2000) the case detection rate was 75% [24] .

The case detection rates in Al-Anbar for period 2008-2012 were lower than that reported in Iran in 2008 as 72.93% [25] .

In Eastern Mediterranean region , (DOTS) new smear-positive case detection rate had increased 45 fold between 1995 and 2005 , which is about a 16% increase in each country of the region [40], although the case detection rate in Iraq is less than 50%, and its speed of increase is too slow to allow Iraq to anticipate the accomplishment of the global targets of 70% case detection rate (CDR), and MDGs on time. The major gaps that prevent the NTP and other partners from rapidly scaling up TB care fall on two main areas: one is the low case detection rate which is the first and foremost problem, and the other is multi-drug resistant (MDR) TB, which, according to anecdotal evidence, is actually a serious threat to TB control in Iraq.

This deficient case detection rate pointed a big defect of the TB surveillance system, poor diagnostic equipments in PHC centers, low health service coverage, shortage of health workers and poor program performance in Al-Anbar. The global target for tuberculosis (TB) control set by the Millennium Development Goals is a decrease in TB incidence by 2015. Direct measurement of country-level TB incidence using population-based methods is

impractical, emphasizing the need for well-performing surveillance systems and, where these are not available, accurate quantification of incidence and under-reporting of TB, in Iraq (2011) Huseynova S and et al study estimated 14 500 TB cases in Iraq in 2011, of which 31% (95% CI) , (2442) were unreported and concluded that TB surveillance needs to be strengthened to reduce under-reporting [31] .

The case detection rate of sputum smear positive (SS+) cases encouraged by adoption of different strategies as public-private mix (PPM) program and health extension workers (HEWs) program that depend on private health sector and community participation to early detect TB cases.

In the present study the success rate for treatment of TB patients in Al-Anbar for the period 2008-2012 was close to WHO goal, on the other hand, case detection rate of SS+ cases was not satisfactory.

There was no significant association between seasonal variation and TB that was inconsistent with Mabaera and his co-workers (2009) who found a significant association between seasonal variation and TB incidence rate in four countries [41].

The referral of the TB patients to TB centers by community activities in Al-Anbar for period 2008-2012 was very weak (8.5%) which revealed poor community participation in TB management that awakened the ability of TB cases detection The referral of TB cases by private health centers represented 25.2%, most of Al-Anbar population provided by private health care and the percent of 25.2% of referral by private is not satisfactory About 36.6% of TB patients were referred by public activities and 27.4% of them were self-referred. More than half of TB patients (59.6%) in Iraq at 2008 were self-referred, 1.3% of the TB patients were referred by community activities, 28.8% of them were referred by public activities and 10.1% of them were referred by private health activities [3] . A study carried out in South Africa (2004) resulted that 46% of the TB were self-referred, 32% public, 20% private and less than 2% by community activities [42] . There is strong evidence that accessibility and acceptability of health services remain the most important factors in patient adherence [43].

Expanding innovative approaches such as linking the public and private sectors in the treatment and referral of such cases will be critical in reducing TB deaths among the poor. The problem is compounded because people living in poverty and in unstable political situations often move or migrate and therefore may not complete their treatment, leading to drug-resistant forms of the disease [40].

The most important obstacles and problems which facing the implementation of DOTS program in AL-Anbar governorate.

-lack in the number of medical staff particularly specialist respiratory physician

-shortage in the training courses for the staff particularly paramedical staff ,in addition to changing of their places from time to time

-lack of cooperation of medical staff of private hospitals and clinics regarding the referral of TB cases leading to multidrug resistant TB.

-weak participation of the leadership of the community, and media role in health and educated messages about the disease

-Bad security situation and lack of full stability, which sometimes prevent the patients from going to the medical institution .

Limitation of study :- There are inherent limitations to the cross – sectional study design . As in all the observational studies an association may be estimated but may not necessarily be the causal effect . Some of TB patients were uncooperative particularly the females patients because of social stigma .

- War and conflicts situation had a destructive effect on management of TB patients in Al-Anbar governorate regardless the followed strategy.

In order to success the TB control program and the implementation of DOTS strategy in Al-Anbar governorate ,we recommend the followings :

-There must be a secure government commitment and help for the program.

-The new policies about DOTS strategy need abroad support from governmental ,non – governmental organizations and co-operating agencies ,civilian community organizations.

-Re-plan the activities against tuberculosis on solid grounds and reorientation of the tuberculosis control policies towards DOTS implementation through involvement of the heard and sight media.

-Involvement of public health and academic institutions in TB control program through their theoretical and practical seasons.

- A comprehensive program review with improving the quality of reporting in health facility accompanied by monitoring and evaluation of program by cohort analysis.

Conclusions:-

- DOTS is widely accepted as an essential strategy for achieving tuberculosis control, and was played an important role in improving registration and management of TB cases in Al-Anbar governorate. There were a significant association between young-middle age with TB cases and a significant association between male gender and TB cases. The case detection rate for the studied periods was far away from WHO targets and other Iraqi governorates reports.

- Rate of default was higher among patients with extra-pulmonary TB, followed by patients of pulmonary TB with sputum smear positive (SS+) in this study ,while poor community participation

in TB management that awakened the ability of TB cases detection and referral by private sectors which are not satisfactory

- The health education and public-private mix (PPM) have important role in achievement the WHO targets for TB control and DOTS can be implemented successfully in Iraq and also in Anbar governorate.

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