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This is the second issue this year and I would like to point out that MEJFM had 2.5 million readers in 2008 - thank you to all our readers for your ongoing support.

In this issue we are starting a continuing educational supplement on TB will run in the next few editions of the MEJFM. It was written for the Nepal CME Program / Volume 7 / Infectious diseases and will be free to air in the next and subsequent issues of the Middle East Journal of Family Medicine, due to great regional need for quality education on the topic. QA&CPD is the highest world standard medical education and the only educational format that has proven educational outcomes for practising doctors, and those wishing to use the education formally can request the additional evaluation module, also available free.

The education was written/developed late in 2008 by a team of TB experts and medical educators working in the field of TB, in the region, for the Nick Simons Institute and World CME. We thank the Nick Simons Institute and World CME, and their authors, for this contribution to quality regional medical education.

A paper from Saudi Arabia investigated the causes of non-registration for antenatal care at local PHC centers. The study involved 1,996 mothers from urban, rural and hegar (deserts collection) areas. About two-fifths of mothers failed to register for antenatal care at their local PHCC for a variety of reasons. The authors concluded that there is room for improvement in coverage and registration at local PHCCs. They added that the increasing role of private health services in providing maternity care necessitates a liaison between PHC and private clinics with adequate feedback for proper monitoring and evaluation of maternity care at the community level.

A prospective study in multiple hospitals in Jordan looked at the Incidence and Types of Eye Injuries in Patients with Major Trauma. Of the 190 patients with major trauma, 17 (11.2%) patients had associated ocular injuries and 37 (19.5%) patients had a facial fracture. The incidence of ocular injuries in patients with major trauma is low, but considerable association was found between eye injuries and facial fractures. Young adults have the highest incidence of ocular injury. The authors concluded that it is vital that all patients with major trauma for the face to be examined specifically for an ocular injury.

Ammoura A M, HalasahN looked at white coat syndrome. The authors studied 240 patients whose details were recorded in the family practice clinic. Patients were selected according to the discordance in blood pressure readings (by doctor, nurse and home measurements), during a period of three years. Out of 240 patients, 60 patients were labeled hypertensive, (25%) of cases, and the rest of the patients were kept on follow up as white coat syndrome. The authors pointed that the best way to diagnose hypertension when in doubt about white coat syndrome, is accomplished by using a 24-hour ambulatory blood pressure monitor.

A paper from India looked at ACINETOBACTER as an EMERGING NOSOCOMIAL PATHOGEN. A study was performed of the clinical samples submitted to the microbiology laboratory of a teaching hospital over a period of 2 years. Out of a total of 5,352 infected samples, 258 (4.8%) were found to be due to Acinetobacter. The authors concluded that multi-drug resistant Acinetobacter nosocomial infection has emerged as an increasing problem in intensive care units of the hospital. The analysis of risk factors and susceptibility pattern will be useful in understanding the epidemiology of this organism in a hospital setup.

A paper from Turkey looked at Prevalance of osteoporosis among dialysis patients. A total of 30 patients undergoing dialysis therapy were enrolled in the study. The patients bone mineral density was evaluated, which was measured by left heel quantitative ultrasound before and after the active vitamin D therapy. The blood samples were collected for biochemical analysis in the morning after a 12 hour fasting period before and after the active vitamin D therapy. The authors concluded that before the treatment there was not a statistical difference between the T score of the 3 groups. After the treatment there was a statistically significant difference, especially the T score was better after the therapy, and in the second group PTH values were between 120-250 pg/ml.

A second paper from turkey attempted to assess the prevalence of Helicobacter pylori in dyspeptic and non-dyspeptic patients, via the HpSA test, to show short term effects of triple eradication therapy on clinical and bacteriological recovery. One hundred dyspeptic patients and 49 patients complaining of other problems were included in the study. While the incidence of H. pylori amongst dyspeptic patients was 60%, the rate was 34.7% in non-dyspeptic patients. The H. pylori incidence rate amongst dyspeptic patients was significantly high (p=0.005). H. pylori risk in dyspeptic patients increased 2.94 fold. This increase was statistically significant (p=0.006). Following therapy, both groups showed a statistically-significant reduction in symptom scores. The

success rate of the eradication therapy was 80.5% (per protocol) . When all patients receiving eradication therapy were considered, the success rate was 58.9% (intention-to-treat). The authors concluded that H. pylori infection is prevalent amongst dyspeptic patients. H. pylori infection should be taken into consideration during the treatment of dyspeptic patients. The use of the stool antigen test is effective in diagnosis and treatment of H. pylori infection.

Finally, this year we bring an additional service to our readers. The back issues and abstracts of articles in the MEJFM, ME-JAA, MEJN ME-JIM and New Paradigm Journal, will be made available via key word search and via password access, for all registered readers of these journals, via the ME-HN - Middle East Health Network. The ME-HN will also provide monthly newsletters, journal alerts via email, free 'classifieds' (positions wanted/ vacant) and a range of discounted goods and services. Details can be found in this month's edition.

Antenatal Care in Al-Hassa, Saudi Arabia: A Situation Analysis

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ABSTRACT

Objectives: To reveal causes of non-registration for antenatal care at local PHC centers; to reveal causes for not receiving antenatal care; and to assess coverage, sources and contents of antenatal care.

Methods: The study involved 1996 mothers from urban, rural and hegar (deserts collection) areas. Trained nurses collected data from family files and maternity cards kept at primary health care centers (PHCC), as well as interview with mothers, within two weeks after delivery, during registration of new births.

Results: About two-fifths of mothers failed to register for antenatal care at their local PHCC for a variety of reasons. Furthermore, 2.3% of them failed to seek antenatal care from any source mainly due to the idea that pregnancy is normal and there is no need for care. On average, each mother received 7.8 antenatal visits and about 72% of them initiated care at the first trimester of pregnancy. Different independent predictors were found to be associated with failure to register for antenatal care, failure to receive antenatal care, late initiation of prenatal care, seeking antenatal care at private clinics.

Conclusion: Despite a high level of antenatal care coverage, there is room for improvement in coverage and registration at local PHCCs. The increasing role of private health services in providing maternity care necessitates a liaison between PHC and private clinics with adequate feedback for proper monitoring and evaluation of maternity care at the community level.

Introduction

The fifth Millennium Development Goal (MDG) is to improve maternal health through preventing unplanned and high-risk pregnancies and providing care in pregnancy, childbirth and the postpartum period to save womens' lives[1]. Protecting the health of mothers during reproduction safeguards their future contributions to society and ensures the health and productivity of future generations[2].

The problems affecting health of mothers are multi-factorial. Maternal morbidities are preventable through effective maternal care programs[3,4]. In Saudi Arabia, consanguineous marriage, marriage at early age, repeated un-spaced pregnancies resulting in high parity as well as pregnancy and delivery at early and late ages, are factors that lead to a higher rate of complications. Because of socio-economic, biological and health factors and despite availability of good health services, the quality of maternal care needs to be monitored and improved at all levels of health care, particularly at the primary health care (PHC) level[5].

Supervision of maternal health is an essential component of primary health care. This involves regular antenatal check ups and referral to hospital if any complications are anticipated[6]. Antenatal services are useful to care for mother and fetus simultaneously. Effective antenatal services can be refined if one knows the existing maternal health problems. The complete and regular coverage of all expectant mothers at all levels of health care delivery is essential[4]. The primary aim of antenatal care is to achieve at the end of a pregnancy a healthy mother and a healthy baby. The current international accepted antenatal care schedule for a normal pregnancy consists of 13 visits (monthly first six months, twice monthly in the 7th and 8th months and weekly in the 9th month)[3,5,6].

Antenatal care is a complex set of activities (basically a multi-phasic screening procedure) aimed at reducing maternal and fetal morbidities and mortality. Excessive concern about reaching a fixed number of antenatal visits has obscured the fact that content and quality of care was considered a luxury not available to developing countries. It was assumed that any form of care would be in some

way good, useful, and accepted[7].

Results from a nationally representative family health survey in Saudi Arabia, indicated that around 90% of mothers received antenatal care[8]. Another study in the Northern Region of Saudi Arabia indicated that only 8% of mothers never received antenatal care, however only 66.9% and 95.9% of mothers of urban and rural areas, respectively, were found to have registered at their local primary health centers (PHCC)[9].

By reviewing the health statistics of maternity care in Al-Hassa PHCC, it was noticed that there is a discrepancy between numbers of registered births and numbers of mothers registered for antenatal care and delivered during the 1426 H. (15032 live births vs. 9729 delivered mothers and registered for antenatal care)

This study aims to assess coverage, sources, and contents of antenatal care; to reveal causes of non-registration for antenatal care at local PHC centers; and to reveal causes of not receiving antenatal care.

Materials

This study was carried out in Al-Hassa, Saudi Arabia, during a period of six months from January 1 to the end of July 2007 G.

Sample size was calculated using Epi Info 2004 software. From statistics of Al-Hassa Directorate of Health 15032 births were registered during 1426, Hegira and non-registered mothers were 35.3%. With confidence interval of 95% and power of 80%, the number of mothers required was 1908.

This sample size was recruited during a period of 4 months in both urban and rural area. In Hegar , study period was 6 month due to low workload.

Two-stage stratified sampling technique was used. First stage is stratification of Al-Hassa into urban, rural and Hegar (desert Bedouin collections) areas. At the second stage, five primary health care (PHC) centers were chosen from each stratum.

Data was collected by direct interview with mothers. In addition, maternity cards for mothers attended for antenatal care at the PHC center were reviewed. Mothers were assured that data collected will be dealt with confidentially and the impact of the study will be respected, maintained, and used only for research purposes and for improving services.

Field supervisor as well as nurse interviewers were oriented about the project and trained on data collection.

In each center, a list was prepared for all registered births during study period, on weekly basis. Mothers of these births were separated into registrants at their local PHC centers and non-registrants.

*Registered mothers: data were abstracted on standardized form from both family file and maternity cards kept in family file at PHC centers as well as direct interview with the mothers. Maternity card has been developed to include the appropriate data on prenatal, natal, and postnatal care, as well as, a list of factors of high-risk pregnancy for referral purposes. Ministry of Health has developed special guidelines for using the card, explaining its contents and how to use it, as well as defining the various measurements and investigation and their normal limits. It is shared by the health centers and hospital. There is continuous stress on completeness of this card[5].

*Non-registered mothers: A questionnaire for non-registrants was prepared and pre-tested during the pilot study on 60 mothers in other health center not chosen in the full-scale study. This form revealed whether the mother received any antenatal care, its source and contents, and reasons for choosing other sources of care or not attending for care at all. These in addition to socio-demographics of the family and reproductive characteristic of the mother.

In each PHCC an Arabic speaking female nurse completed questionnaires during interview with mothers during birth registration (within two weeks of birth).

Data were analyzed using SPSS (Statistical Package for Social Sciences) version 11. Descriptive statistics were done. Unpaired student's t test and ANOVA (F) test with Bonferroni multiple comparisons were used for comparison of quantitative variables between different groups, as appropriate. For categorical the chi-square, or Fisher's exact test (FET) was used as a test of significance, as appropriate. Significant predictors of violence in bivariate analysis were entered into multivariate stepwise forward Wald logistic regression analysis. P=0.05 was considered statistically significant.

Results

During the study period a total of 2130 births were registered in the chosen health centers. These belong to 2107 mothers. About ninety-five percent of target mothers (1996) were involved in the study. More registrants than non-registrants were studied (97.0% vs. 91.6% of target, respectively). Forty-six mothers (2.3 of studied mothers) never received antenatal care.

The commonest reasons of not seeking antenatal care were the idea that pregnancy is normal with no need for care (54.3%), busy husbands (37.0%), and PHC center is far from home (21.9%). Other reasons are lack of transportation, busy mothers, not present at the usual residence during pregnancy and unwanted pregnancy. In 8.4% of mothers no reason was cited. On the other hand, the commonest reasons of non-registration at local PHC centers were busy husband's (29.1%), no specialist or female doctor at local PHC center (28.1%), attending care at husband's or own health insurance (27.9%), long waiting/overcrowding of local PHC centers (11.8%), not present at the usual residence during pregnancy (11.1%) and others (data not shown in tables).

Table (1) shows that failure to register for antenatal care at their local PHCC was less likely in rural and hegar, family with unsatisfactory income and husbands other than professional and semiprofessional. However, it more likely among highly

educated parents, older maternal age, and more pregnancy spacing. On the other hand, mother of hegar residence, with unsatisfactory family income, living away from PHCC, with large family size, more gravidity, low educational level are less likely to receive antenatal care whatever its source. However, logistic regression revealed that the independent predictors of failure to register for antenatal care at local PHCC are parental education, maternal age, and pregnancy spacing. Only residence and maternal education are the independent predictors of failure to seek antenatal care[2].

Table (3) shows that mothers of rural and hegar residence, with unsatisfactory income, and married to non-professional husband are less likely to seek private clinics for antenatal care. On the other hand, highly educated mothers with highly educated husbands, older age mothers and those with more pregnancy spacing are more likely to seek antenatal care at private clinics. On the other hand, More than 28% of mothers initiated care after the first trimester of pregnancy. Later initiation of antenatal care is more likely to be reported by mother of rural and hegar residence, working mother and of older gravidity. On the other hand, mothers seeking care at private and facilities other than PHCC are less likely to delay initiation of care. However, logistic regression analysis revealed that the independent predictors of seeking antenatal care at private clinics are residence, family income, husband's education and work, maternal age and pregnancy spacing. The independent predictors of late initiation of antenatal care are maternal work and source of antenatal care (table 4).

On average, each mother received 7.8 visits during the index pregnancy. Mother of urban residence, with satisfactory income, with high education, housewives, married to highly educated husbands, of high gravidity and seeking antenatal care in facilities other than PHCC are more likely to attend more antenatal care visits, compared to the other groups.

Only 1.1 of them was not protected by tetanus toxoid and 6.3% of them never had ultrasound examination during their antenatal care. Other contents of antenatal visits were listed in table (6). Some antenatal procedures were likely to be done in PHCC e.g. height measurement, blood group/ Rh testing, tetanus toxoid coverage, edema testing and sickle cell testing. However, most investigations are more likely to be repeated in private clinics e.g. ultrasound, urine analysis, hemoglobin testing and blood sugar estimation.

Discussion

Currently, the primary health care program of the Kingdom of Saudi Arabia has become well established, with the attainment of a very wide coverage. Special emphasis was placed on the quality issues of maternal health services. Certain aspects of maternal health care can be deducted from the results of statistical and/or survey data. Health care services provided by the governmental sector in Saudi Arabia accounts for over 80% of total services and almost provided free of charge. Health care is also provided by other agencies e.g. National Guard, ARAMCO and private sector[8].

More than two-fifths of mothers studied failed to register for antenatal care at their local PHCC. The main reasons cited for this failure were busy husbands or mother, absence of specialists and/or female doctors at PHCC as well as availability of family health insurance at private clinics and long distance from the local PHCC. Logistic regression revealed that mothers with unsatisfactory family income are less likely to fail to register for antenatal care at their local PHCC. On the other hand, highly educated mothers, with long pregnancy spacing and married to educated mothers are more likely to fail to register for antenatal care at their local PHCC. A study in the Northern Region of the Kingdom revealed that the rates of defaulting were 33.1% and 4.1% in urban and rural areas, respectively, with the same reasons of defaulting[9].

Antenatal coverage is one of the indicators of the maternal and reproductive health indicators. It is the percentage of women who have attended at least once during their pregnancy to be checked by skilled health care personnel for reasons related to pregnancy[10]. For most pregnant women, participation in antenatal care is not motivated by health problems. They attend in order to confirm pregnancy is proceeding normally[11]. We found that 2.3% of mothers interviewed never received antenatal care during the index pregnancy. This is much lower than the findings from other regions of the Kingdom. The percentage of never receiving prenatal care ranged from 8% in Northern region[9], to 30% in Riyadh and Al-Majma'ah[12-14] and up to 80% to 90% in Tarut island, Al-Hassa and Al-Khobar[15-17]. The national figure of those not receiving antenatal care was estimated to be about 33% of mothers in 1989[18]. This figure declined to 14% in 1991[20] and in 1995 further declined to 6% was reported[21]. Results from a nationally representative Family Health survey indicated that around 10% of the mothers never received antenatal care[8]. This increase in antenatal coverage is attributed to the expansion of maternity health services in the Kingdom, especially after full implementation of PHC with continuous training of health team as well as more public awareness.

Social and cultural constraints may be an obstacle to attendance, lack of resources and quality are major constraints[22]. The commonest reasons for not receiving antenatal care were the false belief that pregnancy is a normal state and that there is no need for care, followed by busy husbands to accompany mothers to PHCC, and PHCC is far away from home. The same reasons of defaulting were reported in different proportion by other studies[9,15,16,18].

The logistic regression analysis revealed that the independent predictors of failure to receive prenatal care were residence and maternal education. Mothers living in hegar (desert collection) are more likely to default antenatal care. Most of these are mobile nomadic mothers. In addition, mothers that are more educated are less likely to default antenatal care. Previous studies revealed the same findings[9,18].

Literacy denotes a greater recognition of the need for the services, wider knowledge of the services available and greater ability to make full use of them[18].

The timing of antenatal care is crucial to its effectiveness. Women should report to health centers as soon as she feels that she is pregnant. This does not happen because the community is conservative, the husband may not be free to accompany his wife to the health center, and most women are busy caring for the child at home[23].

In this study 71.8%, 16.8%, and 11.3% of mothers registered for care during the first, second and third trimesters, respectively. This agrees with the finding of the Northern region study[23]. Mothers with late initiation do not have either the recommended minimum number of visits during pregnancy or the minimum first trimester evaluation. In the Saudi Arabia child health survey, 85% and 7% of mothers have their first visit in the first and third trimester, respectively[18]. In the W.H.O. randomized clinical trial of antenatal care in Jeddah, 42% initiated care in the first trimester[24]. In USA and Australia 84% and 60% of mothers initiated care in the first trimester[25,26]. A much lower rate of initiation of care in the first trimester were reported from developing countries[27-31].

Logistic regression analysis revealed that working mothers are more likely to initiate care in the third trimester. On the other hand, mothers received antennal care at private clinics are less likely to delay initiation. This agrees with other studies[23,32].

Number of antenatal visits ranged from 1-18 with a mean and median of 7.8 and 8 visits, respectively. This is lower than the mean of 8.4 reported from the Northern region[23], but comparable to the findings from Riyadh and Al-Qassim regions of Saudi Arabia[32,33]. In the Saudi Arabia health survey, more than 90% had at least four check-ups and around three-fifths had seven or more check-ups[18]. Higher average number of visits up to 15 was reported from developed countries[34,35]. A lower number of visits were reported from developing countries[28,31,36].

Mean number of visits are significantly more frequent among housewives urban mothers, with satisfactory family income, highly educated and married to educated husbands, primigravida, multigravida with long pregnancy spacing, and those seeking care at private clinics. This agrees with different studies[8,36-38].

Most studies have focused on the quantity and timing of antenatal care visits, but few on the contents. The quality of services provided and the standard of care a woman receive will encourage the families to seek prenatal care. The Ministry of Health guidelines[5,39] were utilized for the assessment of the quality of care provided to pregnant women in PHCC in Saudi Arabia, these guidelines were in accordance with the WHO standards and constitute part of the quality assurance program implemented in PHC in the Kingdom.

Among procedures that done once during pregnancy (height measurement, blood group and Rh testing) were done for more than 93% of mothers. Among the non-routine laboratory tests that were required on need, pregnancy test and sickle cell testing were the most frequently done. The procedures that should be repeated each visit i.e. weight, blood pressure, abdominal examination and fetal heart sound auscultation, urine analysis, blood sugar and hemoglobin estimation were done for nearly all mothers. The mean numbers of repetition of these procedures were highest for weight, blood pressure and urine analysis (7.6, 7.8 and 7, respectively). These findings are more or less similar to the findings of the Northern region[23], but the number of repetition is lower than our study.

The W.H.O. randomized controlled trial in Jeddah, revealed that the clinical activities repeatedly done included physical examination (100%), blood pressure measurement (99.6%), obstetric examination (100%), uterine height measurement (93%0, maternal weight gain monitoring (95.6%), Rh testing (98%), urinary tract infection screening (99.3%) and fasting blood glucose test (90%)[24].

According to the guidelines devised by Ministry of Health[5,39], antenatal mothers should be routinely referred for ultrasonic examination at least twice, the first between 16 and 18 weeks and the later between 34 to 36 weeks to ensure their wellbeing. In our study about 94% of mothers received ultrasonic examination with a mean of 2.5. A previous studies reported that 57.6% and 52.6% of mothers received ultrasonic examination once, respectively[23,24].

Tetanus toxoid immunization should be given as early as possible during pregnancy. Mothers who were not immunized previously should be given two doses of adsorbed tetanus toxoid, spaced at least four weeks apart. In each subsequent pregnancy, a booster dose is given and the fifth dose will protect her for life[5,39]. In our study, only 1.1% of mothers were not fully protected against tetanus. This is much lower than other studies[8,21,23,24].

The role of private sector is expanding in Saudi Arabia in all health services including maternity care. In this study 31.9% of mothers received antenatal attended the private clinics. In Saudi Arabia Family Health survey, just 15% received antenatal care from private health clinics[8]. In agreement with the same authors, we found that educated parents, professional husbands are associated with increased likelihood of seeking antenatal and natal care at private clinics.

Despite the high coverage of antenatal, there is room for improvement in the quality of care, especially in PHCC. PHC staff should periodically trace defaulting mothers through telephone communication or home visits.

Good record keeping is essential for ongoing assessment of the quality of care for evaluation and making decision. A computerized data base system will be very useful in this aspect.

The expanding role of private clinics in maternity care necessitates a liaison between these clinics and PHCC with adequate feedback system during antenatal care.

Continuous re-training of PHCC staff is mandatory with recruitment of female doctors to implement the maternity care. The adoption of the policy of family doctor may contribute to more improvement of maternity care.

References

1. Alan Guttmcher Institute and UNFPA. Adding it up. The benefits of investing in sexual and reproductive health care. 2003 P.6.
2. Meyer CD, Sahn D. The relationship between poverty and maternal morbidity and mortality in sub-saharan Africa. Agency for Health Care Research and Quality. Department of Health and Human Services. WP 213. December 2006.
3. Park K. Park's textbook of preventive and social medicine. 19th edition Banarsidas Bhanot 2007. P414.
4. Kulkarni A, Baride JP. Textbook of community medicine. Vora Medical Publications. 1st edition 1998. P440.
5. Ministry of Health, Saudi Arabia. Quality assurance in primary health care manual. 1st ed. WHO-EMR/PHC/81-A/G/93. El-Hilal Press, Riyadh, 1994:241-315.
6. Radhakrishnan G, Malik R, Gupta P. Reproductive health. In Gupta P and Ghai OP (eds.) Textbook of preventive and social medicine. 2nd ed. CBS publishers & distributors. New Delhi, Bangalore (India). 2007. P.347.
7. Brace V, Penney G, Hall M. Quantifying severe maternal morbidity: a Scottish population study. Br J Obstet Gynecol 2004;111(5):481-484.
8. Khoja TA, Farid AM. Saudi Arabia Family Health Survey, Ministry of Health, Saudi Arabia. 2000.
9. El-Gilany A, Aref Y. Failure to register for antenatal care at local primary health care centers. Ann Saudi Med 2000;20(3-4):229-232.
10. W.H.O. Selecting indicators for monitoring reproductive health progress in human reproductive research. No. 45, UNDP/UNFPA/WHO/World Bank 1998.
11. Lindmrk G, Berendes h, Meirik O. Antenatal care in developed countries. Pediatr and perinatal Epidemiol 1998; 12(Suppl. 2):4-6.
12. Thomssen P, Langemark L, Kumar R. Stillbirths and antenatal care at a rural district hospital. Ann Saudi Med 1989;9:186-9.
13. Swailem AR, Serenius F, Edressee AW, Ohlsson A. Perinatal mortality in a Saudi maternal hospital. Acta Paediatr Scand (Suppl.) 1988;346:57-69.
14. Serenius F, Edresse AW, Swailem AR. Characteristics of the obstetric population in a Saudi Maternity Hospital. Acta Paediatr Scand 1988;Suppl. 346:29-43.
15. Bhatty MA, Al-Sibai H, Marwah SM. A survey of mother- and child-care in Saudi community in Rabaiyah, Tarut island. Saudi Med J 1983;4:37-43.
16. Ogbonna BN, Sumra S, Zeyadha E, Bukhurj E. A review of late fetal deaths in Al-Hassa: a retrospective study. Ann Saudi Medicine 1989;9:561-4.
17. Tapan KC, Suleim A, Jessica R, et al. A review of high risk factors in 586 patients delivered at Al-Khobar Teaching Hospital. Proceeding of the 7th Saudi Medical Meeting, King Saud University, 1982;366-9.
18. Al-Mazrou Y, Farid S. Saudi Arabia Child Health Survey, Saudi Arabia; Ministry of Health 1991: 173-222.
19. (19)Baldo MH. Maternal health care. In: Quality assurance in primary health care manual. Ministry of Health Saudi Arabia, WHO-EMRO/PHC/81-A/G/93. 1st ed. 1994.
20. Baldo MH, Al-Mazrou YY, Farag MK, Aziz KM, Khan MU. Antenatal care, attitudes and practices. J Trop Paediatr 1995;41(Suppl. 1): 21-9.
21. (21)Al-Mazrou Y, Al-Jeffri M, Mishkhas AA, Mohamed OM, Aziz KS. Vaccination coverage survey, Saudi Arabia 1995. Ministry of Health, Riyadh, Saudi Arabia. Final Report 1997.
22. (22)Villar J, Bergsjo P. Scientific basis for the content of routine antenatal care. I-Philosophy, recent studies and power to eliminate or alleviate adverse maternal outcome. Acta Obstet Gynecol Scand 1997;76:1-14.
23. (23)El-Gilany A, Al-Hozem N, Aref Y. Maternity care in primary health care centers, Northern Region, Saudi Arabia. Saudi J Obstet Gynecol 2002;2(3):99-112.
24. Piaggio G, Ba'aqeel H, Bergsjo P, et al. The practice of antenatal care: comparing four study sites in different parts of the world participating in the World Health Organization antenatal care randomized clinical trial. Pediatr and Perinatal Epidemiol 1998;12(Suppl. 2):116-141.
25. Hamilton BE, Martin JA, Sutton PD. Births: preliminary data for 2003. National Vital Statistics Reports; 53(9). Hayttsville, MD: National Center for Health Statistics. 2004.
26. Trinh LTL, Rubin G. Late entry to antenatal care in New South Wales, Australia. BMC, Reproductive Health 2006;3:8.
27. Yesudian PP. Impact of women's empowerment, autonomy and attitude on maternal health care utilization in India. International Institute for Population Sciences, India F.38-327.
28. Kavaneetham K, Dharmalingam A. Utilization of maternal health care services in South India. Center for Development Studies. A Report. Oct 2000
29. Vanneste AM, Ronsmans C, Chakraborty J, DeFrancisco A. Prenatal screening in rural Bangladesh: from prediction to care. Health policy and Planning 2000;15(1):1-10.
30. Barnett S, Azad K, Barua S, et al., Maternal and newborn-care practices during pregnancy, childbirth and postnatal period: A comparison in three rural districts in Bangladesh. J Health Popul Nutr 2006;24(4):394-402.
31. vanEijk AM, Bles HM, Odhiambo F, et al., Use of antenatal services and delivery care among women in rural Western Kenya: a community based survey BMC Reproductive Health 2006;3:2.
32. Al-Shammari SA, Khoja TA, Jarallah JS. The pattern of antenatal visits with emphasis on gestational age at booking in Riyadh health centers. J Royal Soc Health 1994;114(2):62-6.
33. Al-Amri AH, Hegazy IS, Ramzy HA, Qureshi NA, Al-Beyari TH. A study of utilization of maternal health services at primary health care centers,Al-assim Region, Saudi Arabia. Health Services J Eastern Mediterr Region. W.H.O,1993;7(2):8-14
34. Howie PW, McIlwaine G, Florey CV, Tucher JS. What is antenatal care in Scotland? Final Report: contact K/OPR/2/2/C875;1991.
35. Gissler M, Hemminski E. Amount of antenatal and infant outcome. Eur J Obstet Gynecol 1994;56:9-14.
36. Singh P, Yadav RJ. Antenatal care of pregnant women in India. Indian J Community Medicine 2000;25(3):112-117.
37. Furuta M, Salway S. Women's position within the household as a determinant of maternal health care use in Nepal. International family Planning Perspective 2006;32(1):17-27.
38. Collin SM. A decade of inequality in maternity care: antenatal, professional attendance at delivery, and cesarean section in Bangladesh (1991-2004). International J for Equity in Health 2007; 6:9.
39. Ministry of Health, Saudi Arabia. Maternal and child health services manual .

Table 1 Bivariate analysis of predictors of failure of mothers to register for antenatal care at their local PHC centers and not seeking antenatal care

Predictors	Total N (%)	Non-registration		No antenatal care	
		N (%)	OR(95%CI)	N (%)	OR(95%CI)
Total	1996(100)	821(41.1)		46(2.3)	
Residence:					
Urban	971(48.6)	470(48.4)	1(r)	13(1.3)	1(r)
Rural	799(40.0)	286(35.8)	0.6(0.5-0.7)***	15(1.9)	1.4(0.6-3.2)
Hegar	226(11.3)	65(28.8)	0.4(0.3-0.6)***	18(8.0)	6.4(2.9-14.0)***
Family income:					
Satisfactory	1589(79.6)	732(46.1)	1(r)	28(1.8)	1(r)
Unsatisfactory	407(20.4)	89(21.9)	0.33(0.3-0.4)***	18(4.4)	2.6(1.4-4.9)**
Distance from PHCC:					
Up to 1 km	1142(57.2)	469(41.1)	1(r)	16(1.4)	1(r)
> 1 Km	854(29.3)	352(41.2)	1.01(0.8-1.2)	30(3.5)	2.6(1.3-5.0)**
Family size:					
5 or less	1157(58.0)	495(42.8)	1(r)	17(1.5)	1(r)
> 5	839(42.0)	326(38.9)	0.9(0.7-1.02)	29(3.5)	2.3(1.2-4.5)**
Maternal education:					
Illiterate/Primary	482(24.1)	142(29.5)	1(r)		
Preparatory	267(13.4)	122(45.7)	2.0(1.5-2.8)***	31(4.1)	1(r) a
Secondary	756(37.9)	307(40.6)	1.6(1.3-2.1)***	5(0.7)	0.2(0.1-0.4)***
Above secondary	491(24.6)	250(50.9)	2.5(1.9-3.3)***	10(2.0)	0.5(0.2-0.97)*
Maternal work:					
House wife	1669(83.6)	681(40.8)	1(r)		
Work outside home	206(10.3)	100(48.5)	1.4(1.01-1.9)*	42(2.5)	1(r) a
Student	121(6.1)	40(33.1)	0.7(0.5-1.1)	4(1.2)	0.5(0.2-1.4)
Husband's education:					
Illiterate/Primary	406(20.3)	107(26.4)	1(r)		
Preparatory	429(21.5)	137(31.9)	1.3(0.96-1.8)	25(3.0)	1(r) a
Secondary	696(34.9)	319(45.8)	2.4(1.8-3.1)***	12(1.7)	0.6(0.3-1.2)
Above secondary	465(23.3)	258(55.5)	3.5(2.6-4.7)***	9(1.9)	0.6(0.3-1.5)

Husband's work:					
Professional/semiprof	653(32.7)	345(52.8)	1(r)		
Police/military	387(19.4)	145(37.5)	0.5(0.4-0.7)***	10(1.5)	1(r) a
Trades/business	411(20.6)	148(36.0)	0.5(0.4-0.7)***	15(3.6)	2.4(1.02-5.9)*
Others	545(27.3)	183(33.6)	0.45(0.4-0.6)***	21(2.3)	1.5(0.7-3.4)
Maternal age:					
<20 years	96(4.8)	22(22.9)	1(r)		
20-35 years	1561(78.2)	646(41.4)	2.4(1.4-4.0)***	40(2.4)	1(r) a
35 & more	339(17.0)	153(45.1)	2.8(1.6-4.8)***	6(1.8)	0.7(0.3-1.8)
Gravidity:					
Primigravida	481(24.1)	216(44.9)	1(r)		
2 & 3	664(33.3)	272(41.0)	0.9(0.7-1.1)	19(1.7)	1(r) a
4 & more	851(42.6)	333(39.1)	0.8(0.6-1.0)	27(3.2)	1.9(1.03-3.7)*
Spacing*:			1(r)		
<1 year	409(20.5)	48(11.7)	6.3(4.5-8.9)***	39(3.3)	1(r) a
1-3 years	784(39.3)	357(45.5)	12.3(8.3-	4(1.2)	0.4(0.1-1.1)
> 3 years	322(16.1)	200(62.1)	18.3)***		

aThe first two categories were merged as a reference group.
** Primigravidae were excluded*
OR= Odds ratio, CI= Confidence Interval, r= reference group

Table (2): Multivariate logistic regression analysis of significant predictors of failure of mothers to register for antenatal care at their local PHC centers and not seeking antenatal care

Predictors	**Non-registration**			**No antenatal care**		
	b	**P**	**OR(95% CI)**	**b**	**P**	**OR(95% CI)**
Family income:						
Satisfactory	-		1(r)			
Unsatisfactory	-0.9	0.000	0.4(0.3-0.5)			
Residence:						
Urban				-		1(r)
Rural				0.3	0.4	1.4(0.6-2.9)
Hegar				2.0	0.000	7.7(3.3-18.1)
Maternal education:						
Illiterate/Primary	-		1(r)			
Preparatory	0.4	0.02	1.5(1.1-2.2)	-		1(r) a
Secondary	-0.1	0.5	0.9(0.7-1.2)	-1.7	0.001	0.2(0.1-0.5)
Above secondary	0.3	0.2	1.3(0.9-1.9)	-0.5	0.2	(0.2-1.4)
Husband's education:						
Illiterate/Primary	-		1(r)			
Preparatory	-0.1	0.6	0.9(0.6-1.3)			
Secondary	0.6	0.000	1.8(1.3-2.5)			
Above secondary	0.8	0.000	2.2(1.5-3.2)			
Spacing*:						
<1 year	-		1(r)			
1-3 years	1.8	0.000	5.9(4.2-8.2)			
> 3 years	2.4	0.000	10.6(7.2-15.7)			
Maternal age:						
<20 years	-		1(r)			
20-35 years	0.8	0.003	2.2(1.3-3.8)			
35 & more	1.2	0.000	3.4(1.8-6.2)			
Constant	-3.2			-3.7		
Percent correctly predicated	68.4			97.7		
Model X^2	391.4,P=0.000			50.5.2,P=0.000		

aThe first two categories were merged as a reference group.
**Primigravidae were excluded*
OR= Odds ratio, CI= Confidence Interval, r= reference group

Table (3): Bivariate analysis of seeking antenatal care at private clinics and late initiation antenatal care

Predictors	**Total N (%)**	**ANC at private clinics**		**Late initiation of antenatal care**	
		N (%)	**OR(95%CI)**	**N (%)**	**OR(95%CI)**
Total	1950(100)	622(31.9)		549(28.2)	
Residence:					
Urban	958(49.1)	376(39.2)	1(r)	249(26.0)	1(r)
Rural	784(40.2)	211(26.9)	0.6(0.5-0.7)***	224(28.6)	1.1(0.9-1.4)
Hegar	208(10.7)	35(16.8)	0.3(0.2-.5)***	76(36.5)	1.6(1.2-2.3)**
Family income:					
Satisfactory	1561(80.1)	564(36.1)	1(r)	425(27.2)	1(r)
Unsatisfactory	389(19.9)	58(14.9)	0.3(0.2-0.4)***	124(31.9)	1.3(1.0-1.6)
Distance from PHCC:					
Up to 1 km	1126(57.7)	361(32.1)	1(r)	309(27.4)	1(r)
> 1 Km	824(42.3)	261(31.7)	1.0(0.8-1.2)	240(29.1)	1.1(0.9-1.3)

Family size:	1140(58.5)	376(33.0)	1(r)	315(27.6)	1(r)
5 or less	810(41.5)	246(30.4)	0.9(0.7-1.1)	234(28.9)	1.1(0.9-1.3)
> 5					
Maternal education:					
Illiterate/Primary	460(23.6)	90(19.6)	1(r)	145(31.5)	1(r)
Preparatory	258(13.2)	95(36.8)	2.4(1.7-3.4)***	70(27.1)	0.8(0.6-1.2)
Secondary	751(38.5)	249(33.2)	2.0(1.5-2.7)***	194(25.8)	0.8(0.6-0.99)*
Above secondary	481(24.7)	188(39.1)	2.6(1.9-3.6)***	140(29.1)	0.9(0.7-1.2)
Maternal work:					
House wife	1627(83.4)	511(31.4)	1(r)	451(27.7)	1(r)
Work outside home	204(10.5)	78(38.2)	1.4(0.99-1.9)*	73(35.8)	1.5(1.1-2.0)*
Student	119(6.1)	33(27.7)	0.8(0.5-1.3)	25(21.0)	0.7(0.4-1.1)
Husband's education:				120(30.6)	
Illiterate/Primary	392(20.1)	66(16.8)	1(r)	136(32.5)	1(r)
Preparatory	418(21.4)	103(24.6)	1.6(1.1-2.3)**	164(24.0)	1.1(0.8-1.5)
Secondary	684(35.1)	242(35.4)	2.7(2.0-3.7)***	129(28.3)	0.7(0.5-0.95)*
Above secondary	456(23.4)	211(46.3)	4.3(3.0-4.0)***		0.9(0.7-1.2)
Husband's work:					
Professional/semiprof	643(33.0)	291(45.1)	1(r)	177(27.5)	1(r)
Police/military	385(19.7)	77(20.0)	0.3(0.2-0.4)***	119(30.9)	1.2(0.9-1.6)
Trades/business	396(20.3)	116(29.3)	0.5(0.4-0.7)***	101(25.5)	0.9(0.7-1.2)
Others	526(27.0)	138(26.2)	0.4(0.3-0.6)***	152(28.9)	1.1(0.8-1.4)
Maternal age:					
<20 years	96(4.9)	20(20.8)	1(r)	22(22.9)	1(r)
20-35 years	1521(78.0)	479(31.5)	1.8(1.03-3.0)*	427(28.7)	1.4(0.8-2.3)
35 & more	333(17.1)	123(36.9)	2.2(1.3-3.97)**	90(27.0)	1.3(0.7-2.2)
Gravidity:					
Primigravida	478(24.5)	167(34.9)	1(r)	103(21.3)	1(r)
2 & 3	648(33.2)	209(32.3)	0.9(0.7-1.2)	194(29.9)	1.6(1.2-2.1)**
4 & more	824(42.3)	246(29.9)	0.8(0.6-1.0)	252(30.6)	1.6(1.2-2.1)**
Spacing*:					
<1 year	407(20.9)	35(8.6)	1(r)	124(32.9)	1(r)
1-3 years	747(38.3)	268(35.9)	6.0(4.0-8.8)***	231(30.9)	0.9(0.7-1.2)
> 3 years	318(16.3)	152(47.8)	9.7(6.3-15.0)***	81(25.5)	0.7(0.5-0.98)*
Source of antenatal care:					
PHCC	1183(60.7)			404(34.2)	1(r)
Private	622(31.9)			119(19.1)	0.5(0.4-0.6)***
Others#	145(7.4)			26(17.9)	0.4(0.3-0.7)***

** Primigravidae were excluded, # Governmental hospitals, National Guard, shared care.*
OR= Odds ratio, CI= Confidence Interval, r= reference group

Table (4): Multivariate logistic regression analysis of independent predictors of seeking antenatal care at private clinics and late initiation antenatal care

Predictors	**ANC at private clinics**			**Late initiation of antenatal care**		
	b	**P**	**OR(95% CI)**	**b**	**P**	**OR(95% CI)**
Residence:	-		1(r)			
Urban	-0.4	0.001	0.7(05-0.8)			
Rural	-0.2	0.3	0.8(0.5-1.2)			
Hegar						
Family income:	-		1(r)			
Satisfactory	-1.0	0.000	0.4(0.3-0.5)			
Unsatisfactory						
Maternal education:						
Illiterate/Primary	-		1(r)			
Preparatory	0.6	0.002	1.8(1.2-2.7)			
Secondary	0.1	0.05	1.4(1.1-1.4)			
Above secondary	0.7	0.002	1.9(1.2-2.6)			
Husband's education:						
Illiterate/Primary	-		1(r)			
Preparatory	0.2	0.4	1.2(0.8-1.7)			
Secondary	0.7	0.000	2.1(1.4-3.1)			
Above secondary	0.9	0.000	2.4(1.5-3.9)			
Husband's work:						
Professional/semiprof	-		1(r)			
Police/military	-0.8	0.000	0.4(0.3-0.6)			
Trades/business	-0.1	0.5	0.9(0.6-1.3)			
Others	0.1	0.6	1.1(0.8-1.6)			
Maternal work:				-		1(r)
House wife				0.5	0.009	1.6(1.1-2.3)
Work outside home				0.1	0.8	1.1(0.5-2.5)
Student						

Maternal age: <20 years 20-35 years 35 & more	- 0.6 1.0	 0.03 0.002	1(r) 1.9(1.1-3.2) 2.7(1.4-5.0)			
Spacing*: <1 year 1-3 years > 3 years	- 1.6 2.0	 0.000 0.000	1(r) 5.2(3.5-7.6) 7.2(4.7-11.0)			
Source of antenatal care: PHCC Private Others#				- -0.8 -0.8	 0.000 0.000	1(r) 0.4(0.3-0.6) 0.5(0.3-0.7)
Constant Percent correctly predicated Model X^2	-3.1 70.5 335,5,P=0.000			-0.6 69.8 312,2,P=0.000		

**Primigravidae were excluded, # Governmental hospitals, National Guard, shared care.*
OR= Odds ratio, CI= Confidence Interval, r= reference group

Table (5): Factors affecting number of antenatal care visits.

Predictors	**Total N (%)**	**Number of visits X±SD**	**Significance test**
Overall	1950(100)	7.75±3.8	
Residence: Urban Rural Hegar	 958(49.1) 784(40.2) 208(10.7)	 8.04±3.9AB 7.5±3.4A 7.2±4.3B	 F=6.2, P=0.002
Family income: Satisfactory Unsatisfactory	 1561(80.1) 389(19.9)	 7.9±3.8 7.2±3.7	 t=3.1; P=0.002
Distance from PHCC: Up to 1 km > 1 Km	 1126(57.7) 824(42.3)	 7.8±3.8 7.6±3.8	 t=1.1; P=0.3
Family size: 5 or less > 5	 1140(58.5) 810(41.5)	 7.8±3.8 7.7±3.7	 t=0.6; P=0.5
Maternal education: Illiterate/Primary Preparatory Secondary Above secondary	 460(23.6) 258(13.2) 751(38.5) 481(24.7)	 7.2±3.6AB 8.3±3.9A 7.8±3.6B 7.8±4.0	 F=5.2, P=0.000
Maternal work: House wife Work outside home Student	 1627(83.4) 204(10.5) 119(6.1)	 7.8±3.7 A 7.1±3.9 A 7.8±3.8	 F=3.1, P=0.05
Husband's education: Illiterate/Primary Preparatory Secondary Above secondary	 392(20.1) 418(21.4) 684(35.1) 456(23.4)	 7.4±3.5C 7.6±3.6 7.8±3.9 8.1±3.9C	 F=3.4, P=0.02
Husband's work: Professional/semiprof Police/military Trades/business Others	 643(33.0) 385(19.7) 396(20.3) 526(27.0)	 7.8±3.8 7.6±4.0 7.9±3.6 7.7±3.7	 F=0.4, P=0.7
Maternal age: <20 years 20-35 years 35 & more	 96(4.9) 1521(78.0) 333(17.1)	 7.9±3.6 7.7±3.8 7.9±3.8	 F=0.3, P=0.8
Gravidity: Primigravida 2 & 3 4 & more	 478(24.5) 648(33.2) 824(42.3)	 8.3±3.8AB 7.6±3.6A 7.5±3.8B	 F=6.3, P=0.002
Spacing*: <1 year 1-3 years > 3 years	 407(20.9) 747(38.3) 318(16.3)	 6.9±3.5AC 7.7±3.8AB 8.3±3.8BC	 F=13.3, P=0.000
Source of antenatal care: PHCC Private Others#	 1183(60.7) 622(31.9) 145(7.4)	 6.6±3.2AB 9.55±3.9A 9.4±3.6B	 F=163.9, P=0.000

** Primigravidae were excluded, # Governmental hospitals, National Guard, shared care.*
A, B and C significant difference between the corresponding groups by Bonferroni multiple comparisons

Table (6): Quality of antenatal care and its variation by the source.

Procedure	Total N(%)	Source of antenatal care			Significance test
		PHCC N(%)	Private N(%)	Others N(%)	
Overall	1950 (100)	1183(100)	622(100)	145(100)	
Height measurement	1829(93.8)	1147(97.0)	543(87.3)	139(95.9)	c2=66.5, P=0.000
Blood group/Rh testing	1859(95.3)	1164(98.4)	559(89.9)	136(93.8)	c2=67.4, P=0.000
Tetanus toxoid (≥ 2 doses)# Mean ± SD	1929(98.9) 3.94±1.2	1177(99.5) 4.0±1.2 A	611(98.2) 3.8±1.3A	141(97.2) 3.8±1.4	c2=9.2, P=0.002 F=6.8, P=0.001
Weight measurement# Mean ± SD	1946(99.8) 7.6±3.7	1182(99.9) 6.5±3.2 AB	619(99.5) 9.4±3.9 A	145(100) 9.3±3.6 B	FET, P=0.3 F=160.2, P=0.000
Blood pressure measurement# Mean ± SD	1949(99.9) 7.8±4.5	1183(100) 6.6±3.2 AB	621(99.8) 9.5±3.9 A	145(100) 9.3±3.6 B	FET, P=0.2 F=159.1, P=0.000
Edema testing Mean ± SD	1818(93.2) 5.9±3.3	1160(98.1) 5.9±3.2 A	527(84.7) 4.9±3.9 A	131(90.3) 5.3±3.6	c2=116.8, P=0.000 F=19.5, P=0.000
Abdominal examination and FHS auscultation# Mean ± SD	1944(99.7) 6.6±3.2	1183(100) 6.4±3.1 A	617(99.2) 6.9±3.3 A	144(99.3) 6.9±3.1	FET, P=0.004 F=5.9, P=0.003
Ultrasound# Mean ± SD	1827(93.7) 2.5±2.5	1163(98.3) 1.4±0.97 AB	619(99.5) 4.1±2.6 AC	145(100) 3.4±1.8 BC	c2=6.7, P=0.009 F=557.6, P=0.000
Urine analysis Mean ± SD	1939(99.4) 6.98±3.7	1176(99.4) 6.4±3.2 AB	619(99.5) 7.7±4.5 A	144(99.3) 8.1±3.8 B	FET, P=1.0 F=34.4, P=0.000
Blood sugar# Mean ± SD	1913(98.1) 2.4±1.98	1152(97.4) 1.7±1.2 AB	617(99.2) 3.4±2.6 A	144(99.3) 3.5±2.2 B	c2=8.5, P=0.004 F=195.7, P=0.000
Hemoglobin testing# Mean ± SD	1930(98.9) 3.4±3.0	1168(98.7) 3.2±1.6 A	618(99.4) 3.6±2.5 A	144(99.3) 3.5±1.6	c2=1.7, P=0.2 F=7.2, P=0.001
Sickle cell testing	489(25.1)	460(38.9)	14(2.2)	7(4.8)	c2=32.7.6, P=0.000
Pregnancy test	1219(62.5)	604(51.1)	602(96.8)	13(9.0)	c2=555.4, P=0.000
IFA/tonics	1836(94.2)	1073(90.7)	622(100)	141(97.2)	c2=65.1, P=0.000
Others*	59(3.0)	25(2.1)	26(4.2)	8(5.5)	c2=9.3, P=0.01

**Brucellosis, toxoplasmosis, Hepatitis Bs antigen, VDRL, stool analysis, pregnancy test, urine culture*
FHS= fetal heart sound, IFA= iron & folic acid, FET = Fisher's exact test
A, B and C significant difference between the corresponding groups by Bonferroni multiple comparisons
#Private & others were merged for FET calculation.

Acinetobacter - An Emerging Nosocomial Pathogen

ABSTRACT

OBJECTIVE: Recently, Acinetobacter emerged as an important pathogen and the prevalence of isolation has increased since the last two decades worldwide. Our objective was to see the impact of acinetobacter infection in our hospital; its demographic features, speciation and antibiotic sensitivity and resistance pattern. METHODS: A study of the clinical samples submitted to the microbiology laboratory of a teaching hospital over a period of 2 years (June2001 to June 2003). Identification, speciation and anti-biotyping were performed for the isolates of Acinetobacter recovered from infective samples. Clinical demographic characteristics were studied retrospectively.

RESULTS: Out of a total 5352 infected samples, 258 (4.8%) were found to be due to Acinetobacter. The organism was responsible for 76 (39.64%) cases of urinary tract infection and 38 (29.45%) cases of wound infection and was most prevalent in the intensive care unit (29.84%). A. baumannii was the most predominant species. A high level of resistance was recorded for Ampicillin (86.3%), Cefazolin (93.2%) Gentamicin (61.5%), Cefotaxime (65.8%), Ceftriaxone (61.5%) and Ciprofloxacin (69.2%). Although no peculiar pattern during anti-biotyping was observed, but most of them were multi-drug resistant.

CONCLUSION: Multi-drug resistant Acinetobacter nosocomial infection has emerged as an increasing problem in intensive care units of the hospital. The analysis of risk factors and susceptibility pattern will be useful in understanding epidemiology of this organism in a hospital setup.

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Key Words: acinetobacter, nosocomial, infection, anti-biotyping, multi-drug resistant

Introduction

Acinetobacter spp. is one of the important nosocomial pathogens and has been known to cause different kinds of opportunistic infections[1]. These gram negative coccobacilli are ubiquitous in nature, and responsible for causing intermittent outbreaks especially in regions where temperature is hot and humid. Infections caused by them are difficult to control due to multidrug resistance, which limits therapeutic options in critically ill and debilitated patients especially from the intensive care unit, where its prevalence is most noted[2]. Acinetobacter baumannii is now recognized to be the genomic species of great clinical importance capable of causing life threatening infections including pneumonias, septicemias, wound sepsis, urinary tract infections, endocarditis and meningitis[3].

Also, it is currently the commonest isolate from gram negative sepsis in immunocompromised patients posing a risk for high mortality[4]. The organism prefers moist environments, therefore, its colonization in persons and damaged tissues is common[5]. It is very difficult to explain the role of Acinetobacter acquisition in the ICU, since Acinetobacter does not always act as an infecting pathogen as it is widely distributed and has tremendous colonizing potential[1,6]. Also, there is a significant difference in the behavior of this organism among isolates recovered from various geographic locations[7]. In addition, risk factor for Acinetobacter acquisition, may vary in different set-ups with epidemic outbreaks of infection or endemic colonization[8]. Although various factors predisposing to Acinetobacter infection have been analyzed in different studies, there are only few authentic reports from India that have attempted to determine the risk factors and in-vitro susceptibility and resistance patterns of clinically significant Acinetobacter isolates[9,10,11]. The present study describes our experiences of clinical materials and cases from which strains of Acinetobacter were isolated and to determine the resistance patterns of Acinetobacter isolates to various antimicrobial agents by disc-diffusion methods and micro-broth dilution methods obtained from a tertiary care hospital.

Materials

After taking consent from the hospital ethical committee, the study was carried out in a 600-bed tertiary care hospital located in North India

during a 2 year period (June 2001 through to June 2003). Nosocomially acquired Acinetobacter infection was defined as the isolation of the organism repeatedly from blood cultures and other specimens, 72 hours after a patient was admitted to the hospital. Standard definitions as given by Centre for Disease Control and Prevention were used to differentiate categories of infection versus colonization[13].

In brief, patients from whom Acinetobacter was isolated in absence of clinical disease suggested colonization and were not included in the study. Clinical specimens included were blood, CSF, endo-tracheal aspirate, urine, sputum, pus and other body fluids. The following variables were analyzed: patient age, sex, and the presence of underlying diseases or conditions, admission to ICU, mechanical ventilation, urinary and IV catheterization, number of hospital days and surgery, if any.

All clinical specimens were initially processed by the routine microbiological laboratory tests to separate the non-fermenters from gram-negative bacilli and eventually identified as Acinetobacter. Typical colonies were enumerated, selected and examined further. Acinetobacter was identified by gram-stain, cell and colony, activity of oxidation/ fermentation tests, absence of motility and negative oxidase and positive catalase test. Speciation of Acinetobacter into various genomic species (GS) was done by using a battery of bio-chemical tests[14].

Disc diffusion susceptibility testing was performed on Mueller-Hinton agar for following anti-microbial agents with their concentrations given in parenthesis: Ampicillin (10mg), Amikacin (30mg), Gentamicin (10mg), Ciprofloxacin (5mg), Ofloxacin (5mg), Cefazolin (30mg), Cefotaxime (30mg), cefoperazone+Sulbactam (75mg) and Imipinem (10mg). Strains found resistant to various antimicrobials by disc-diffusion method were tested by NCCLS broth micro-dilution method[15]. Pseudomonas aeroginosa ATCC 27853 was used as a control strain.

We compared the difference in the risk-factors among patients with Acinetobacter infection and patients with other gram-negative bacterial infections and investigated for significant risk factors in patients with these infections. Contingency tables were calculated with Pearson's test of Fischer's exact test by comparing the proportions, wherever necessary. The odds ratio (OR) was calculated and differences were considered to be significant if the P-value associated with the test was less than 0.05. For all the analysis SPSS-software analysis was used.

Results

During the period of two years in the clinical microbiological laboratory at Sheri Kashmir Institute of Medical Sciences, a tertiary care hospital in J&K, 25,200 samples were cultured, of which 5352 (21.23%) were found to be infected. Out of these 258 (4.8%) samples were found to be due to Acinetobacter. The variables such as age, sex, possible source of infection, duration of hospital stay, previous antibiotic therapy and risk-factor distribution are shown in Table 1.

The patients ranged in age from 18 days to 84 years (Mean age ± SD, 33.2± 22.8 yrs, median age 42 years). Acinetobacter was isolated from various types of infections; among these urinary tract infections were extremely significant ($p<0.05$) followed by pus and wound exudates ($p<0.05$).

Likewise the risk factor distribution associated with infection is shown in Table 1. Acinetobacter infection was significantly observed ($p<0.05$) in the intensive care unit, postoperative ward, and patients on mechanical ventilation. Also, a longer stay in hospital, that is beyond the first week, was significantly associated with a remarkably higher rate of infection ($p<0.05$). The underlying chronic debilitating conditions in order of frequency included diabetes mellitus with complications, hypertensive stroke, chronic renal failure, leukaemias, and chronic obstructive lung disease.

No statistical significance was found in relation to age, sex, surgery and duration of hospital stay. The following variables were considered to be biologically plausible risk-factors: admission to ICU, mechanical ventilation, chronic debilitating conditions and prolonged use of IV, and urinary catheters.

A. baumanni was the main species responsible for 72% of the infections followed by A. calcocaeticus and A. junii (10.6% and 7.5 % respectively). A. lwoffii and A. haemolyticus were predominantly found in wound exudates.

The disc-diffusion susceptibility testing results are given in Table 2, which show the percentages of resistance and susceptibility among all isolates. High level of resistance was recorded for Ampicillin (86.3%), Cefazolin (93.2%) Gentamicin (61.5%), Cefotaxime (65.8%), Ceftriaxone (61.5%) and Ciprofloxacin (69.2%). Amikacin, Cefoperazone+Sulbactam and Imipinem showed maximum activity with an overall low resistance of 17%, 11.5%, and 1.5% respectively. Strains of A. baumainnii were found to be more resistant to all antibiotics as compared to other DNA groups. Table 3 shows the range of MIC results obtained which were found to be highly elevated in these isolates. The highest resistance was observed in ICU isolates where A. baumanni was most prevalent.

Discussion

Acinetobacter has emerged as an important nosocomial pathogen, with a rising prevalence, is often multi-drug resistance and associated with life threatening infections[15,16]. The overall incidence of Acinetobacter from all infective samples was 4.8 % (258 out of 5352) indicating its importance as a nosocomial pathogen, since in most of the cases the patients were symptomatic for sepsis. There was a significantly higher incidence of infection among males, which is in tandem with other studies from India[12]. The literature search demonstrates that A. baumannii together with A.calcoaceticus; GS 3, GS13 are predominantly involved in infection and are collectively known as A.calcoaceticus- A. baumannii (Acb) complex group[17]. A. baumanni was the major species isolated from 72% of our clinical samples, and is reportedly a major species in other

parts of the world as well[7] In our study the maximum number of isolates was from the urinary tract (39.64%) and these were the strains that showed maximum multidrug resistance. These results are comparable to some of the studies done previously[2] About 15% of these isolates were associated with the use of indwelling catheters and 30% of the patients had a serious underlying debilitating disease. The incidence of respiratory tract infection was 14.7%. Mechanical ventilation and admission to ICU were found to be independent risk factors for these infections. Bacteremia is known to be associated with risk factors like intravenous catheterization[19] In the present study 17% of the bacteraemic cases were associated with catheterization, about 50% of them had undergone surgery and 24% had been intubated and ventilated. Overall, the significant risk factors for Acinetobacter infection were mechanical ventilation, admission to ICU, underlying chronic debilitating condition and a prolonged hospital stay. A longer stay in a high-risk unit and use of mechanical ventilation has been identified as a risk factor in previous studies as well[17,19,20] Despite many intensive efforts, the nosocomial acquisition of Acinetobacter remains problematic especially in the ICUs. There are difficulties in control of infections due to their high resistance to antimicrobials in the hospital environment. Exposure to certain antibiotics provides a selective advantage to a small number of resistant organisms in patients already colonized, thereby enabling them to turn into pathogens.

Susceptibilities of Acinetobacter against various antimicrobials are considerably different among countries, centers and even among different wards of the same hospital, therefore, such type of local surveillance studies are found important in deciding the most adequate therapy for Acinetobacter infection[2]. The high level resistance of Acinetobacter to antimicrobials seems unstoppable[22]. Only few authentic data are available regarding in- vitro susceptibility of clinical isolates of A. baumannii in India[23]. Increasing resistance to cephalosporins was observed mainly in strains belonging to the Acb complex. Amikacin, cefoperazone+Sulbactam and Imipinem showed maximum levels of activity with susceptibilities of 83%, 87.5%and 98.5% respectively. This susceptibility pattern conforms to the recent introduction of these antibiotics in our hospital. MIC range of our strains was higher than many other recent reports(19,22). This means MDR isolates are increasing day by day, probably due to indiscriminate use of these antibiotics in our setting. We re-emphasize that broad spectrum antibiotics should be used with caution. Cefotaxime, and or ceftriaxone should be discontinued in units where resistant strains for these two antibiotics are being reported. With revelation of Cefotaxime and/or ceftriaxone resistant strains from our study, the hospital ICU was advised to use other antibiotics combinations like effective beta lactams or carbepenem along with amikacin.

Conclusion

In conclusion MDR A. baumannii was the species responsible for the majority of Acinetobacter infection in our hospital. It was also the cause of severe clinical diseases, associated with a high mortality rate. Mechanical ventilation and admission to ICU were found to be potential independent risk factors in our setup. Strict infection control measures may prevent nosocomial infection. Further research related to mechanism of resistance and extended spectrum beta lactamases and carbepenem is under way.

References

1. *Bergogue-Berezin E, TownerKJ. Acinetobacter species as nosocomial pathogen. Microbiological, clinical and epidemiological features. Clin Microbiol Rev 1996; 9:148-65.*
2. *Josh SG, LitakeGM, SatputeMG. Clinical and demographic features of infection caused by Acinetobacter species. Ind J Med Sci 2006; 60:351-60.*
3. *TownerKJ. Clinical importance and antibiotic resistance of Acinetobacter spp. J Med Microbiol 1997; 6:186-97.*
4. *Koprnova J, Svetlansky I, Babel AR, Illinova E, Hanzen J, Zuscakova IJ, etal. Prospective study of antibacterial susceptibility, risk factors and outcome of 157 episodes of Acinetobacter baumannii bacteraemia in 1990 in Slovakia. Scand J Infect Dis 2001; 33:891-5.*
5. *Lahiri KK, Mani NS, Purai SS. Acinetobacter spp as nosocomial pathogens. Clinical significance and antimicrobial sensitivity. Med J Armed Forces India.2004; 60:7-10.*
6. *Forster DH, Daschner F Infect D. Acinetobacter species as nosocomially pathogens. Eur J Clin Microbiol Dis 1998; 17:73-7.*
7. *Houang ET, Chu YW, Leung CM, Chu KJ, Berlau J, Ng KC etal. Epidemiology and infection control implication of Acinetobacter spp in Hong Kong. J Clin Microbiol 2001; 39: 228-34.*
8. *Rello J. Acinetobacter baumannii infections in the ICU. Customization is the key. Chest 1999; 115:1226-9.*
9. *Mittal N, Nair D, Gupta N, Rawat D, Kabra S, Kumar S etal. Acinetobacter spp septicemia in a neonatal ICU. Southeast Asian J Trop Med Public Health 2003; 34:365-6.*
10. *Suri A, Mahapatra AK, Kapil A. Acinetobacter infection in neurosurgical intensive care patients. Natl Med J India 2000; 13:296-300.*
11. *Kapil A, Gulati S, Goel V, Kumar L, Krishnan R, Kochipillai V. Outbreak of nosocomial Acinetobacter baumannii bacteraemia in high risk ward. Med Oncology. 1998; 15:270-4.*
12. *Prashant K, Badrinath S. In vitro susceptibility pattern of clinically significant Acinetobacter species to commonly used cephalosporins, quinolones and amino glycosides. Indian J Medical Microbiol 2004; 22:97-103.*
13. *Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definitions for nosocomial infection. Am Infect Control 1988; 16:128-40.*
14. *Bouvet PJ, GrimontPA, Identification and biotyping of clinical isolates of Acinetobacter. Am Inst Microbiol 1987; 139:569-78.*
15. *National Committee for clinical laboratory standards: Methods for dilution antimicrobial susceptibility tests for bacteria that grow aerobically. Approved Standards M7-A4-NCCLS, Wayne, PA, 2000.*
16. *AroraU, JaitwaniJ. Acinetobacter spp: an emerging pathogen in neonatal septicemia in Amrister, Indian J Med Microbiol 2006; 24:81.*
17. *YuYu, Yang Q, XuXw, KongHS, Xu GY, G BY. Typing and characterization of carbepenems resistant Acinetobacter calcocaeticus- baumannii complex in a Chinese hospital. J Med Microbiol 2004; 53:653-6.*
18. *Sofranou DC, Constandinides TC, Yannacou MB, Anastasssiou H, Sofianose. Analysis of resistant factors for ventilator associated pneumonia in a multidisciplinary intensive care unit. Eur J Clin Microbiol Infect Dis 2000; 19:460-3.*
19. *Cisneros JM, Rodriguez-Bario J. Nosocomial bacteremia due to Acinetobacter baumannii- Epidemiology, clinical features and treatment. Clin Microbiol Infect 2002; 8:687-93.*
20. *Agoda A, Zarrelli R, Barllitta M, Anzaldi A, Di Popolo A, MattalianoA, etal. Alert surveillance of intensive care unit acquired Acinetobacter infection in a Sicillian hospital. Clin Microbiol Infect 2006; 12:241-7.*
21. *Murray CK, Hospenthal DR. Treatment of multidrug resistant Acinetobacter.Curr Opin Infect Dis. 2005;18:502-6.*
22. *Chen HP, Chen TL, Lai CH, Fung CD, Wong WW, Yu KW, etal. Predictors of mortality in Acinetobacter baumannii bacteremia. J Microbiol Immunol Infect. 2005; 38: 127-36.*
23. *Patil JR, Chopade BA. Distribution and in vitro antimicrobiolial susceptibility of Acinetobacter spp. on the skin of healthy humans. Natl Med J India 2001; 14:204-208.*

Table1: Demographic and clinical characterization of patients infected with Acinetobacter spp.

Characteristics	Number of cases	Total percentage %
Age (years):		
0 - 15	44	17.1
15 - 30	43	16.6
30 - 60	72	27.9
≥60	99	38.4
Sex:		
Male	163	63.0
Female	95	37.0
Hospital Stay (days):		
1 - 7	83	32.17
≥7	175	67.83
Indicated source of infection:		
Urinary	102	39.64
Pus and exudates	76	29.45
Respiratory (sputum, BAL etc.)	38	14.72
Blood	18	06.70
CSF	08	03.31
Bone	01	00.38
Peritoneal fluid	01	00.38
Unknown	14	05.42
Risk factor distribution:		
Admission to ICU	73	29.84
Mechanical Ventilation	53	20.54
Existing chronic illness	38	14.72
Urinary and IV catheterization	37	14.34
Endotrachial intubations	12	04.65

Table 2: In-vitro activity of various antimicrobial agents against 258 Acinetobacter isolates.

Antimicrobial agent	Percentage age of isolates	
	Resistance	Sensitivity
Ampicillin	86.3	13.7
Gentamicin	61.5	38.5
Amikacin	17.0	83.0
Ciprofloxacin	69.2	30.8
Ofloxacin	47.0	53.0
Cefazolin	93.2	6.8
Cefotaxime	65.8	34.2
Ceftriaxone	61.5	38.5
Cefoperazone+Sulbactam	11.5	88.5
Imipinem	1.5	98.5

Table 3: Range of MIC for multi-drug resistance strains of Acinetobacter isolates.

Antibiotic	MIC µgm/ml		
	MIC range	MIC 50	MIC90
Ampicillin	4 – 1024	64	≥512
Gentamicin	8 – 256	32	256
Amikacin	1 - 256	16	128
Ciprofloxacin	8– 256	64	256
Ofloxacin	0.15 – 64	4	32
Cefazolin	8 – 1024	512	ND
Cefotaxime	8 – 512	64	≥512
Ceftriaxone	8 – 512	32	≥512

The Efficacy of Helicobacter Pylori Eradication Therapy with HpSA Test in Dyspeptic Patients of A Family Practice Polyclinic

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Key words: Family practice, dyspepsia, Helicobacter pylori, stool antigen test.

ABSTRACT

Aims: To assess the prevalence of Helicobacter pylori in dyspeptic and non-dyspeptic patients, via the HpSA test, to show short term effects of triple eradication therapy on clinical and bacteriological recovery.

Material and Methods: One hundred dyspeptic patients and 49 patients complaining of other problems were included in the study. The patients were selected from a family practice polyclinic. H. pylori infection was detected with the Helicobacter pylori stool antigen (HpSA) test. Patients who were positive for H. pylori were treated with a triple eradication therapy (lansoprazole 2*30 mg,amoxicillin 2*1 g and clarithromycin 2*500 mg for two weeks). Patients who tested negative for H. Pylori were treated with lansoprazole 1*30 mg for four weeks. All dyspeptic patients were recalled to be controlled after six weeks. A 5-point Likert scale was used to assess the pre therapy and post therapy symptoms. The test was repeated for patients who received eradication therapy.

Results: While the incidence of H. pylori amongst dyspeptic patients was 60%, the rate was 34.7% in non-dyspeptic patients. The H. pylori incidence rate amongst dyspeptic patients was significantly high (p=0.005). H. pylori risk in dyspeptic patients increased 2.94 fold. This increase was statistically significant (p=0.006). Following therapy, both groups showed a statistically-significant reduction in symptom scores. The success rate of the eradication therapy was 80.5% (per protocol). When all patients receiving eradication therapy were considered, the success rate was 58.9% (intention-to-treat).

Conclusion: H. pylori infection is prevalent amongst dyspeptic patients. H. pylori infection should be taken into consideration during the treatment of dyspeptic patients. The use of the stool antigen test is effective in diagnosis and treatment of H. pylori infection.

Epidemiology

Dyspepsia is a prevalent health problem with a relatively high incidence rate[1]. The annual prevalence of dyspepsia in Western countries is 25% and dyspepsia constitutes 2-5% of all primary level consultations. It is a basic cause for morbidity and economic loss. Furthermore, it seriously affects the quality of life of patients[2].

Understanding of the etiology of gastrointestinal illnesses has improved during the last 20 years[3]. Warren and Marshall cultured H. pylori culture and identified a link with gastritis and stomach ulcers in 1982[4]. In the following years, epidemiological studies linked some strains of this bacterium with a slightly increased lifetime risk of stomach cancer and MALT lymphoma[3]. Dyspeptic patients show a significantly higher rate of H. pylori incidence than the general population[5].

The Maastricht II Consensus Report by the Europe Helicobacter study group advises that the diagnosis and treatment of H. pylori should be carried out at a primary level. The Maastricht II-III Consensus Report advises the use of PPI based amoxicillin (A) and clarithromycin (C) or metronidazole (M). The report also advises the use of the Helicobacter pylori stool antigen test (HPSA) and urea breath tests in diagnosis and treatment of H. pylori[6,7].

The aim of the present study was to assess the prevalence of H. pylori in dyspeptic and non-dyspeptic patients and to show the short-term effects of eradication therapy and acid suppression.

Methodology

Patients were selected from the Yalim Erez Family Practice Polyclinic affiliated to the Faculty of Medicine at Cukurova University, Turkey. 100 patients with dyspeptic complaints and 49 patients with other complaints were included in the study consecutively. Patients who agreed to participate in the study were informed about the aim and method of study and subsequently the written consent of patients was obtained.

The selection criteria for dyspeptic patients were as follows: patients aged 18 years and above; patients who have had dyspeptic complaints for a month or more; patients who did not have alarming symptoms (newly-onset dyspepsia in people over 45, dysphagia, unexplained weight loss etc.); patients who did not have a history of gastroesophageal reflux, irritable bowel syndrome, cholelithiasis or dominant symptoms; patients who had not undergone stomach surgery; patients who were not pregnant or breast feeding; patients who did not have complaints while using analgesics or aspirin; patients who did not use antibiotics, bismuth, or proton pump inhibitor (PPI) during the previous two weeks; patients who did not have a serious illness.

The criteria for patients who did not have dyspeptic complaints were as follows: patients aged 18 years and above and patients who did not have dyspeptic complaints.

Questionnaires were completed via face-to-face interviews in both groups of patients. Pre treatment dyspeptic symptoms (epigastric pain, discomfort, early satiety, fullness, bloating, nausea) were assessed using a five-point Likert scale:

1. No problem
2. Minor problem (patient is able to ignore symptoms)
3. Moderate problem (symptoms cannot be ignored and it affects daily activities)
4. Serious problem (prevents patients from concentrating on daily activities)
5. Major problem (seriously affects daily activities and/or causes need for rest)

Stool samples were taken from patients and stored at -20 oC. The samples were tested with Platinum HpSA test (Meridian Diagnostic Inc.) for H. pylori twice a week at the Faculty of Medicine/Department of Microbiology, Cukurova University. Optical density was assessed as follows: in 450 mg <0.140 is negative, a value between 0.140 and 0.159 is susceptible and >0.160 is positive.

Triple ((lansoprazole 30 mg 2*1, amoxicillin 1 g 2*1 and clarithromycin 500 mg 2*1) (LAC) eradication therapy was administered for 14 days to dyspeptic patients who were positive for H. pylori. Lansoprazole 30 mg 1*1 was administered to dyspeptic patients who were negative for H. pylori. Patients who were not dyspeptic did not receive any kind of therapy.

After six weeks from the beginning of therapy both positive and negative patient groups were called to control. Dyspeptic symptoms during the post treatment period were scored with the Likert scale. The HpSA test was repeated for patients who were positive for H. pylori and received eradication therapy.

Data was analyzed using Statistical Package for Social Sciences (SPSS) 11.0 software. Statistical evaluation included chi square test, ANOVA and logistic regression.

Results

One hundred dyspeptic patients were included in the study. 49 patients complaining about other problems were selected as the non dyspeptic group. The patients were selected from a family practice polyclinic. The age of dyspeptic patients ranged between 18 and 67 (average 34.52 ± 13.023). The age of the control group patients was varying between 18 and 74 (average 40.08 ±14.167). The duration of dyspeptic complaints ranged between 1 to 480 months (average 63.09 ± 74.04 months).

A flowchart of the study process is shown in Figure 1.

The prevalence of H. pylori in both groups is shown in Table 1. While the prevalence of H. pylori was 60% in dyspeptic patients and 34.7% in non-dyspeptic patients. The prevalence of H. pylori was significantly higher in dyspeptic patients. (p=0.005)

The increase of risk in dyspeptic patients is shown comparatively, based on logistic regression modeling (Table 2). The risk was 2.94 times higher in dyspeptic patients. This variation between the two groups is statistically significant. (p=0.06)

The symptom scores of both the group of patients who received eradication therapy and patients who received PPI are shown in Table 3. The post treatment decrease of symptom scores in both groups was statistically significant.

Of the 60 dyspeptic patients who were positive for H. pylori, 56 patients underwent eradication therapy (2 patients were excluded for pregnancy and 2 patients did not consent to the therapy). 41 patients completed the study in the H.pylori (+) group. (4 patients were excluded for side effects, 2 patients were excluded because they did not use the medicine as prescribed and 9 patients were excluded because they did not participate in controls).

Of the patients who were negative for H. pylori and received PPI for 4 weeks, 32 patients followed the controls.

The results of the HpSA test after eradication therapy are shown in Table 4. The success of the eradication therapy was assessed as 80.5% (33/41) per protocol. When all patients who received eradication therapy were considered, the success rate of the eradication therapy was 58.9% (33/56) -intention-to-treat.

Discussion

The prevalence of H. pylori was significantly higher in dyspeptic patients when compared with the non-dyspeptic group. (Tables 1 and 2)

A previous study on the prevalence of H. pylori in both dyspeptic patients and the general population was conducted in eight European countries. That study found that the prevalence of H. pylori ranged between 25% and 85% in dyspeptic patients and between 15% and 70% in the general population[5].

The results of the present study support the findings of the above mentioned study. Koçak et al. found 61% prevalence of H. pylori in 80 patients of a gastroenterology polyclinic who had dyspeptic complaints[8]. The present study found similar rates amongst dyspeptic patients. A study conducted in Istanbul on the prevalence of H. pylori using the HpSA test in patients who were susceptible to H. pylori infection, reported a rate of 36.6%[9]. This is lower than the rate found in

the present study.

The higher prevalence of H. pylori indicates that there may be some relationship between dyspeptic illnesses and this bacterium. The results of the present study are similar to those within the literature.

A significant improvement in symptoms was observed in both the eradication therapy and PPI therapy groups. (Table 3) A study in Turkey on symptoms of H. pylori eradication therapy in non-ulcer dyspeptic patients found significant short term recovery based on total symptom scores[10].

Many polyclinic and multi-centered studies have reported a success rate of A and K therapy combined with PPI of between 80% and 95%[11-14]. Meta-analysis of 112 studies found the eradication rate ranged between 71.9% and 83.3%[12]. The Maastricht II Consensus Report advises the triple regimes of C and A or M combined with PPI as the premium option, but recent studies assert that the success of eradication is less than 80%, due to C or M resistance of PPI based regimes[15-17]. A meta-analysis in 1997 assessed the success rate with LAC as 84.4%. This meta analysis found a steady decrease in eradication rates. In 2004, the eradication rate was assessed as 55.3%[18]. The eradication rate of the present study is 80.5%, which is similar to other studies of LAC. The use of HpSA is assessed as an effective tool to evaluate diagnosis and treatment of H. pylori infection at the primary level. Although the HpSA testing was conducted by the department of microbiology in the present study, the necessary equipment is easily obtained and there is no need to submit samples to a specialist testing facility. These features show the efficacy and ease of the test.

Conclusion

Dyspeptic patients present a significantly higher incidence of H. pylori than the general population. Underlying results of dyspepsia are related to H. pylori. H.pylori eradication should be taken into consideration in dyspepsia. HpSA is a noninvasive and practical test suitable for use at the primary level.

References

1. *British Society of Gastroenterology. Dyspepsia Management Guidelines. The Clinical Services and Standarts Committee, British Society of Gastroenterology, 3 St Andrews Place, Regent's Park, London NW1 4 LB, 2002*
2. *Talley N J. Dyspepsia:management guidelines for the millenium. Gut 2002;50(suppl 4): 72-78*
3. *Suerbaum S, Michetti P. Helicobacter pylori infection. The New England Journal of Medicine 2002;347:1175-1186*
4. *Lynch N A. Helicobacter pylori and Ulcers: a Paradigm Revised Access: http:/www.org/opar/pylori/pylori.html. Date accessed: 8.5.2003.*
5. *de Wit N J, Merdive J, Seifert B, Cardin F, Rubin G. Guidelines on the management of H.pylori in primary care:development of an implementation strategy. Family Practice 2000; 17(suppl II):27-32.*
6. *Malfertheiner P, Megraud F, Morain C O, Hungins A P S, Jones R, Axon A. Current concepts in the management of Helicobacter pylori infection-The Maastricht 2-2000 Consensus Report. Aliment Pharmacol Ther 2002;16:167-180.*
7. *P. Malfertheiner, F. Megraud, C.O'Morain, F. Bazzoli, E El-Omar, D Graham et al. Current concepts in the management of Helicobacter pylori infection-The Maastricht III Consensus Report Gut 2007;56:772-81*
8. *Koçak F. Evaluation of the new immunological assays for the diagnosis of Helicobacter pylori infection. Cukurova University Faculty of Medicine Department of Internal Medicine, Subdivision of Gastroenterology, Adana, Fellowship Thesis 2002;20-29.*
9. *Büyükbaba-Boral O, Küçüker M, Aktas G, Issever H. HpSA fecoprevalence in patients suspected to have Helicobacter pylori infection in Istanbul, Turkey Int J Infect Dis. 2005 Jan; 9(1):21-6*
10. *Köksal AS, Parlak E, Oguz D, Cicek B, Sahin B. The short term effect of Helicobacter pylori eradication on symptoms in patients with non-ulcer dyspepsia Akademik Gastroenteroloji Dergisi 2006;5(1):36-40*
11. *-Ulmer HJ, Berkerling A, Gatz G. Recent use of proton pump inhibitor-based triple therapies for eradication of H.pylori a broad data review. Helicobacter 2003;8:95-104*
12. *Megraud F, Lehn N, Lind T et all. Antimicrobial susceptibility testing of Helicobacter pylori in a large multicenter trial : the MACH 2 study. Antimicrob Agents Chemother 1999; 43:2447-52*
13. *Malfertheiner P, Bayerdorffer E, Diete U et al. The Gu-Mach study: the effect of 1-week omeprazole triple therapy on Helicobacter pylori infection in patients with gastric ulcer. Alimet Pharmacol Ther 1999;13:703-12*
14. *Zanten SJ, Bradette M, Farley A et al. The DU-MACH study: eradication of Helicobacter pylori and ulcer healing in patients with acute duodenal ulcer using omeprazole based triple therapy: aliment Pharmacol Ther 1999;13:289-95*
15. *Bochenek WJ, Peters S, Fraga PD et al. Eradication of Helicobacter pylori by 7-day triple-therapy regimens combining pantoprazole with clarithromycin, metronidazole, or amoxicilin in patients with peptic ulcer disease: results of two double-blind, randomised studies. Helicobacter 2003;8:626-42*
16. *Palmas F, Pellicano R, Massimetti E, Berruti M, Fagoone S, RizzettoM. Eradication of Helicobacter pylori infection with proton pump inhibitor-based triple therapy. A randomised study. Panminerva Med 2002;44:145-7*
17. *Sivri B, Simsek I, Hulagu S et al. The efficacy, safety and tolerability of pantoprazole-based one-week triple therapy in H.pylori eradication and düodenal ulcer healing. Curr Med Res Opin 2004;20:1301-7*
18. *Kadayifci A, Buyukhatipoglu, Savas C, Simsek I. Eradication of Helicobacter pylori with triple therapy: An epidemiologic analysis of trends in Turkey over 10 years. Clinical Therapeutics 2006;28(11):1960-66*

Table 1 Distribution of H. pylori prevalence in dyspeptic patients and non dyspeptic patients

HPSA result	Dyspeptic Patients, n (%)	Non dyspeptic Patients, n (%)	p
Positive	60(60.0)	17(34.7)	0.005
Negative	40(40.0)	32(65.3)	
Total	100(100.0)	49(100.0)	

Table 2: Comparative Logistic Regression analysis of H. pylori risk increase

Group	OR*	%95 CI**	p***
Dyspeptic patients	reference		
Non dyspeptic patients	2.94	1.37-6.32	0.006

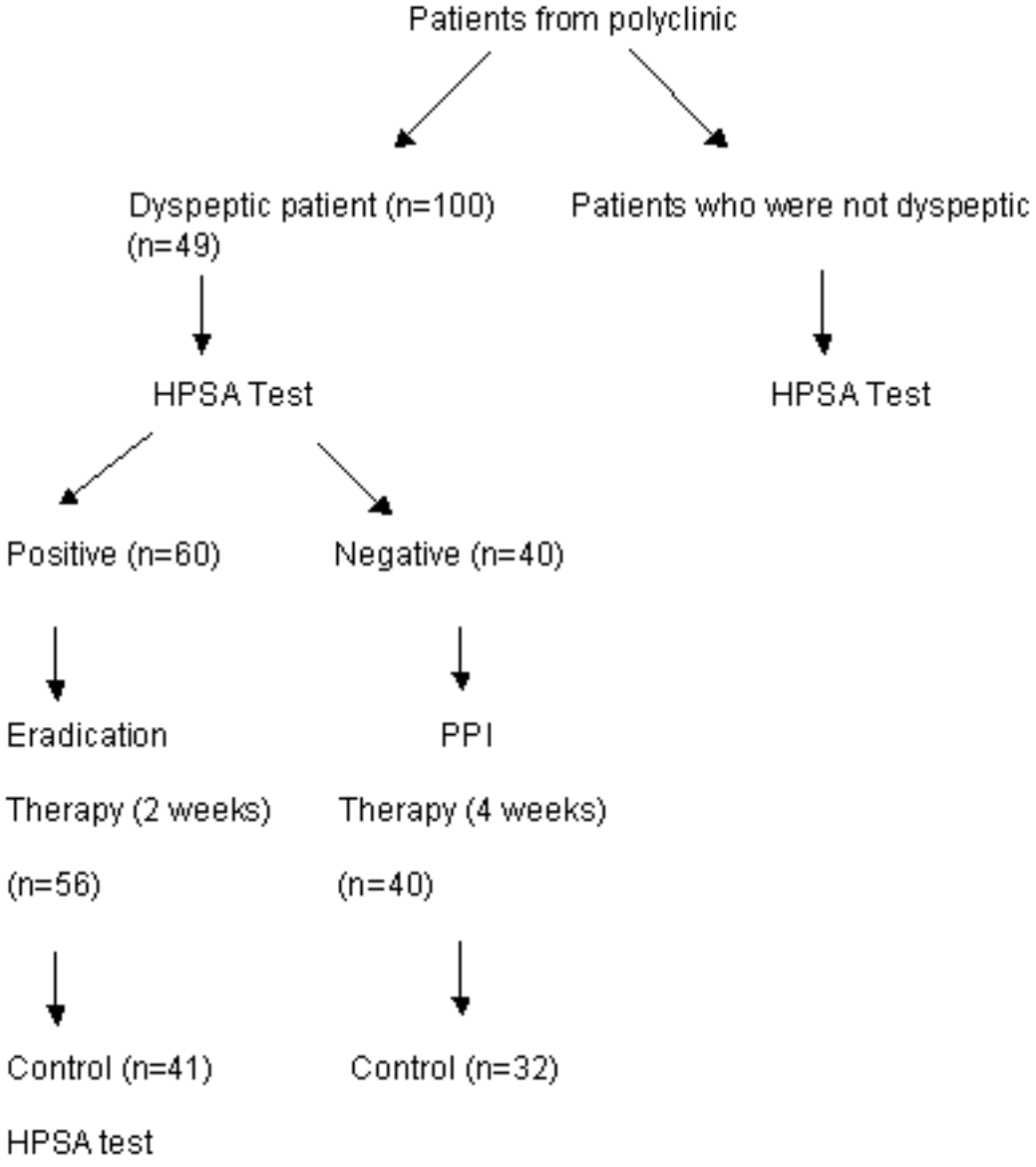
Table 3: Total symptom scores of eradication therapy (H. pylori +) and PPI (H. pylori -)

Total Score	Pre treatment	Post treatment	p
H.pylori(+) dyspeptic	15.48 +5.14	10.46 +4.81	<0.0001
H.pylori(-) dyspeptic	15.33 +5.00	10.18 +4.88	<0.0001

Table 4: HpSA result of after eradication therapy in dyspeptic patients with H. pylori (+)

HPSA Result	Number of patients	Percentage of patients
Positive	8	19.5
Negative	33	80.5
Total	41	100.0

Figure 1: Flowchart: Study Structure



Effect of ß- Thalassemia on Some Biochemical Parameters

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ABSTRACT

Background and objectives: Thalassemia or hemoglobinopathy is a hereditary disease caused by defective globin synthesis resulting in abnormal as well as decreased quantity of globin chains. Ineffective erythropoiesis, hemolysis, and increased red blood cell turnover.

The present study deals with the effects of ß-thalassemia on the following serum biochemical parameters (sodium, potassium, calcium, phosphate and uric acid).

Material and method: A prospective study was carried out from September 2004 to March 2005 by collaboration between clinical biochemistry and pediatric departments in College of Medicine, Hawler Medical University on thirty patients with ß-thalassemia in comparison with thirty normal subjects.

Results: The results showed that there was a significant difference (P< 0.05) in the level of serum Potassium, Calcium, Uric acid and hemoglobin while the differences in sodium and phosphate were not significant.

Conclusion: Based on findings of the present study it can be concluded that ß-thalassemia causes multiple abnormalities in biochemical parameters.

Keywords: **ß- thalassemia, Electrolytes, Uric acid**

Introduction

The thalassemia syndrome is a group of metabolic inherited disorders[1] characterized by microcytic hypochromic red blood cells. The homozygous state, thalassemia major results in a severe anemia and often death before puberty. The heterozygous state, thalassemia minor is less severe and may be asymptomatic with little or no anemia[2,3].

The word thalassemia comes from the Greek “thalassa”, sea referring to thr Mediterranean and “haima”, blood which means blood disease of the sea[3,4,5]. The first description of severe thalassemia as a unique disorder was described in 1925 by a Detroit pediatrician “Thomas Cooley” who described a severe type of anemia in children of Italian origin which was later named after him[3].

Thalassemia represents the most common single gene disorder causing a major public health problem[6].

It is widely distributed through the Mediterranean, Middle East, India, southeast Asia and Africa[5]. Iraq is one of the countries in which 6-10% of the population have hemoglobinopathy of which thalassemia is a major part[7].

The underlying abnormality in the thalassemia syndromes is thought to be absence or reduction in production of hemoglobin[2].

There are 2 types of thalassemia - alpha and beta depending on which globin chain is affected by genetic mutation or deletion[8].

The disease is called beta thalassemia when ß chain production is decreased relative to alpha chain production and alpha thalassemia when a chain production is decreased relative to ß[2, 6].

Over the last 3 decades the development of regular transfusion therapy and iron chelating has dramatically improved the quality of life however in the developing world, poor availability of proper medical care, and safe and adequate red blood cell transfusion, together with poor compliance to chelation therapy remains a major obstacle. Despite the increased life expectancy thalassemia complications keep arising especially iron overload related complications as well as toxicities of iron chelator[9] which may result in metabolic and endocrine abnormalities like hypogonadism, diabetes mellitus, hypothyroidism, hypo-parathyroidism and zinc and copper deficiency[10, 11,12].

Precipitation of alpha globin chains in the thalassemia RBC may interfere with normal membrane function leading to increased calcium content which is more pronounced in splenectomy patients correlates with the degree of anemia[11].

Methods and Materials

1- Subjects

This study was conducted on 60 individuals all under 17 years, thirty 30 of whom were patients with ß-thalassemia and the other thirty 30 were healthy controls.

ß-Thalassemic patients in Erbil were all registered in a pediatric hospital thalassemic unit to receive treatment. The diagnosis of thalassemia was based on hematological criteria

(peripheral blood evaluation and hemoglobin electrophoresis of the patients from early years of life. The mean ± S.E of age was 11.93±1.1 years and the range 1-16 years. While the healthy individuals mean ±S.E of age was 12.2±1.1 years and the range 1-17 years - see Table 1.

2-Blood sample collection:

Three to five millilitres of venous blood was drawn from ß-thalassemic patients and healthy individuals. Collected blood was left standing at room temperature until it clotted, then the sample centrifuged at 300 rpm for 10 minutes for removal of serum from suspended cells. Then the serum was tested for sodium, potassium, calcium, phosphorous and uric acid determination.

3-Instruments

1. 1- Spectrophotometer (Spectronic 21)
2. 2- Centrifuge type Labofuge 200
3. 3- Computer for data analysis
4. 4- Flame photometer (Jenway)

4-Method

Sodium and potassium in Serum was measured by an instrument called a Flame photometer according to Varly[13] method as follows:

Principle of operation (Flame photometry):-

Flame photometry relies upon the fact that the compounds of the alkaline earth metals can be thermally dissociated in a flame and that some atoms produced will be further excited to a high energy level. .When the atoms return to ground state they emit radiation which lies mainly in the visible region of the spectrum (each element emits radiation at a wave length specific to that element[13] while routine biochemical tests were done in serum for phosphorous determination according to Gomorri methods[14].

Serum uric acid and calcium was determined for both groups by an enzymatic colorimetry method by using ready made kits Biomerieux Sa. (France) according to the method of (Barhand and Coms) respectively[15, 16].

5-Statistical evaluation

Statistical analyses were carried out by using some statistical measurements. Biochemical values were presented as the mean±S.EM and range. All analyses for difference between the two independent groups were performed by Student's t tests, with a level of significance assigned at 0.05. Values less than 0.05 ($P<0.05$) were considered to indicate statistical significance[17].

Results

Group I (Healthy individuals):

The mean±S.E for serum Potassium gave values of 4.8±0.1 mmol/L and a range of 3.2-6.4 mmol/L. The mean±S.E for serum Sodium was 139±1.5 mmol/L and the range was 122-150 mmol/L. The mean±S.E values for Calcium, Phosphorous and Uric acid were 11.3±0.3, 4.8±0.3 and 4.6±0.2 mg/dl respectively, with the range of 8.7-15, 1.1-8 and 2.8-8.6 mg/dl respectively as shown in Table 1.

Group II (ß-thalassemic patients):

The mean for serum Potassium gave values of 5.3±0.2 mmol/L and a range of 3.6-7.5. The mean for serum Sodium was 141±1.6 and the range was 122-159 mmol/L. The mean value for Calcium, Phosphorous and Uric acid were 46±0.2, 5.6±0.3 and 5.9±0.3 mg/dl respectively, with the range of 2.4-6.6, 3.5-9.4 and 3.8-91 mg/dl respectively as shown in Table 2.

In comparison between healthy individuals and ß-thalassemiac individuals, it was showed significant differences in serum Potassium ,Calcium, Uric acid and Hb while serum phosphorous and sodium showed no significance - see Table 2 Figure 1 and Figure2.

Discussion

The goal of the present study was to understand the effects of ß-thalassemia on certain serum biochemical parameters (Sodium, potassium, calcium, phosphate and uric acid).

The aim of transfusion is to maintain a hemoglobin level that inhibits ineffective erythropoiesis, marrow expansion and allow normal growth. The hemoglobin should be maintained between 10-14 gm/dl with pre-transfusion hemoglobin of 10-11 gm/dl. Most patients in the present study were suboptimally blood-transfused thalassemics. They had significant anemia of 7.5±0.2g/dl which resulted in growth retardation, delayed puberty, and retarded bone age. These findings were in agreement with the previous studies(1,18,19).

The results obtained in this study as noted earlier showed that the mean value [Mean±S.E.] of serum Potassium for ß-thalassemiac patients was 5.3±0.2 mmol/L. The mean value for Uric acid was 5.9±0.3 mg/dl. The values were significantly higher in ß-thalassemiac patients compared with the control group ($p<0.05$) which is in accordance with Kostas et al(20).

Increased hemolysis and/or red cell turnover might be blamed for the elevated serum potassium and uric acid levels. Highest normal value of uric acid in the beta-thalassemic patients, despite the increased red cell turnover could be due to the increased excretion of uric acid, evidenced by the high fractional excretion in uric acid, which may be the result of the supra normal proximal tubular function(21).

Aldosterone is a mineralo-corticoid which acts on P cells of the distal tubule and causes Na + reabsorption in exchange for K+ or H+ secretion. This defect in potassium secretion is not clinically apparent under normal circumstances, though hyperkalemia is likely to manifest with mild degrees of renal impairment(22). This might explain the slight elevation of potassium to upper normal range in our study.

Furthermore, there was also a statistically significant difference in serum calcium between the control grouip and ß-thalassemiac patients. The same observation for calcium level was also reported by Saka et al(23).

On the other hand a non-significant increase in the mean levels of serum phosphorous was found in patients with ß-thalassemia compared to the control group, This finding is similar to that found by Kostas et al(20)

The ß-thalassemia major results in severe anemia, which needs regular blood transfusion. The combination of transfusion and chelating therapy

has dramatically extended the life expectancy of thalassemic patients[22,23]. On the other hand, frequent blood transfusion in turn can lead to iron overload[24,25].

Hypocalcaemia is a well known complication of iron overload[26]. Iron overload occurs either from the transfusion of red blood cells or because there is increased absorption of iron from the digestive tract. Both of these occur in thalassemia. Iron overload also causes pituitary damage with hypogonadism, endocrine complication, hypothyroidism and hypoparathyroidism is also seen[27].

Parathyroid hormone which is secreted by the parathyroid gland mobilizes calcium from bone[27,28].

A study done by Desanctis 1995 showed that hypocalcemia due to hypoparathyroidism is recognized as a later complication (age 16 year and above) although in our study hypocalcemia was observed in a very younger age. This could be attributed to poor patient compliance due to poor education about the disease. An iron chelating agent with its pump is not always available, and communications between the thalassaemic centers and the patients are not always easy.

Conclusion and Recommendation

1. Pre transfusion Hb value was suboptimal so more effort is required to educate families on better compliance and more support is required for donation of blood to thalassemic centers.
2. Hypocalcaemia is found in early age and might be due to unavailability of a dysferoxamine pump or poor compliance.
3. Serum potassium was found to be in the upper normal range and might be due to mild renal impairment, so future study should be done on the effect of thalassemia on renal function.
4. Screening for thalassemia must be included and other tests pre marriage are required since thalassemia is very common in the north of Iraq.
5. More governmental & non-governmental support is required focusing on availability of therapy, discovery of new cases, as well asl education of families about thalassemia and it's effect on growth.

References

1. *Zakaria M Al-Hawsawi, Ghousia A Ismail, Hanan A. Al-Harbi, Zaki R Al-Sobhi. B-thalassemia major, Saudi Medical Journal; 2003, 24 (9): 1027-1029.*
2. *Robert B.Gunn ,David N.Silvers and Wendell F. Rosse Potassium permeability in ß - Thalassemia minor red blood cells ,Clinical investigation, 1973; 51:1045-49.*
3. *Mangalani M, Lokeshwar M.R, Banerjee R. Bone Histomorphometry in Children and Adolescents with ß-Thalassemia Disease: Iron-Associated Focal Osteomalacia, The Journal of Clinical Endocrinology & Metabolism; 2003; 88(8) 3966-3972.*
4. *Cooley TB, Lee P A series of cases of splenomegaly in children with anemia and peculiar changes Trans Am Pediatr Soc, 1975; 37:29-30.*
5. *David G. Nathan. Prospective on Thalassemia PEDIATRICS 1998; Vol.102 No. 1 Supplement July, PP 281-283 .*
6. *Susanne R. Christoph B. Gunter H..Oral isobutyramide reduces transfusion requirements in some patients with ß-thalassemia 2000, 96(10): 3357-63.*
7. *David P. Steensma, James D. Hoyer and Virgil F. Fairbanks: Hereditary red blood cell disorders in Middle Eastern patients. Mayo Clin Proc.2001; 76:285-293.*
8. *Antia J. Cattin, Thalasssemia : the facts and the controversies, Pediatr Nurs . 2003; 29(6): 447-451. www.medscape .com/viewarticle /466838*
9. *M.B. Agarwal Advances in Management of Thalassemia, indian pediatrics; 2004; 41:989-992.*
10. *Jensen CE, Tuck SM, Agnew JE, Koneru S, Morris RW, Morris RW, Yardumian A, Prescott E, Hoffbrand AV, Wonke B: High prevalence of low bone mass in thalassaemia major .B J Haemat 1998, 103:911-915.*
11. *Shalev O, Mogilner S and Shiner E, Impaired erythrocyte calcium homeostasis in beta-thalassemia. Blood; 1984; 64(2):564-6.*
12. *Alireza Abdollah Shamshirsaz , Mir Reza Bekheirnia, Mohammad Kamgar1, Metabolic and endocrinologic complications in beta-thalassemia major: a multicenter study in Tehran .BMC Endocrine Disorders 2003, 3:4.*
13. *Varly H. Practical clinical biochemistry; Willian, Heineman Medical Books, London, 5th ed 1980, Volume(1) p.771.*
14. *Gomorri G. Determination of serum phosphorous. J. Lab. Clin. Med, 1942, 27:955.*
15. *Corns C and Ludman C Determination of Calcium. Ann .Clin. Biochemistry 1987; 24:345.*
16. *Barham and Trinder. Estimation of serum uric acid. Analyst. 1972; 97:142.*
17. *Danial ww. Biostatistics : a foundation for analysis health science 1983; 3rd. John Wiley and Sons, USA.*
18. *Pat Mahachoklertwattana, Vorachai Sirikulchayanonta, Ampaiwan Chuansumrit. Bone Histomorphometry in Children and Adolescents with ß-Thalassemia Disease: Iron-Associated Focal Osteomalacia. The Journal of Clinical Endocrinology & Metabolism. 2003; 88(8) 3966-3972.*
19. *Saka N, Sukur M, Bundak R, Anak S, Neyzi O, Gedikoglu G Growth and puberty in thalassemia major. J Pediatr Endocrinol Metab; 1995;8:181-186 .*
20. *Kostas P. Katopodis, Moses S. Elisaf, Haralampos A. Pappas. Renal abnormalities in patients with sickle cell-beta thalassemia. J. of. Nephrology ;1997;Vol.10(3):163-167.*
21. *Soliman AT, El Banna N, Abdel Fattah M, ElZalabani MM, Ansari BM.*
22. *Bone mineral density in prepubertal children with beta-thalassemia: correlation with growth and hormonal dataMetabolism. 1998 May; 47 (5) :541-8.*
23. *Saka N, Sukur M, Bundak R, Anak S, Neyzi O, gedikoglu G: Growth and puberty in thalassemia major.J Pediatr Endocrinol Metab, 1995; 8:181-186.*
24. *Modell B, Letsky EA, Flynn DM, Peto R, Weatherall DJ. Survival and desferrioxamine in thalassemia major. BMJ , 1982; 284:1081-1084.*
25. *Jensen CE, et al . High prevalence of low bone mass in thalassaemia major.B J Haemat, 1998; 103:911-915.*
26. *Vullo C, et al. Endocrine abnormalities in thalassemia. Ann NY Acad Sci , 1990; 612:293-310.*
27. *26. Ali hasan dhary aljumaily, Shaimaa khider. Prevalence of hypocalcemia among thalassemic patients registered in IBN, 2005, www.ajman.ac.ae/arabmed/abstracts/poster_session3.pdf.*
28. *Gentner J.: Disorder of calcium and phosphorous homeostasis. Pediatric Clin North Am.1990; 37:1441-1466.Ganong W.S; Review of medical physiology. 2002; 10th ed.*

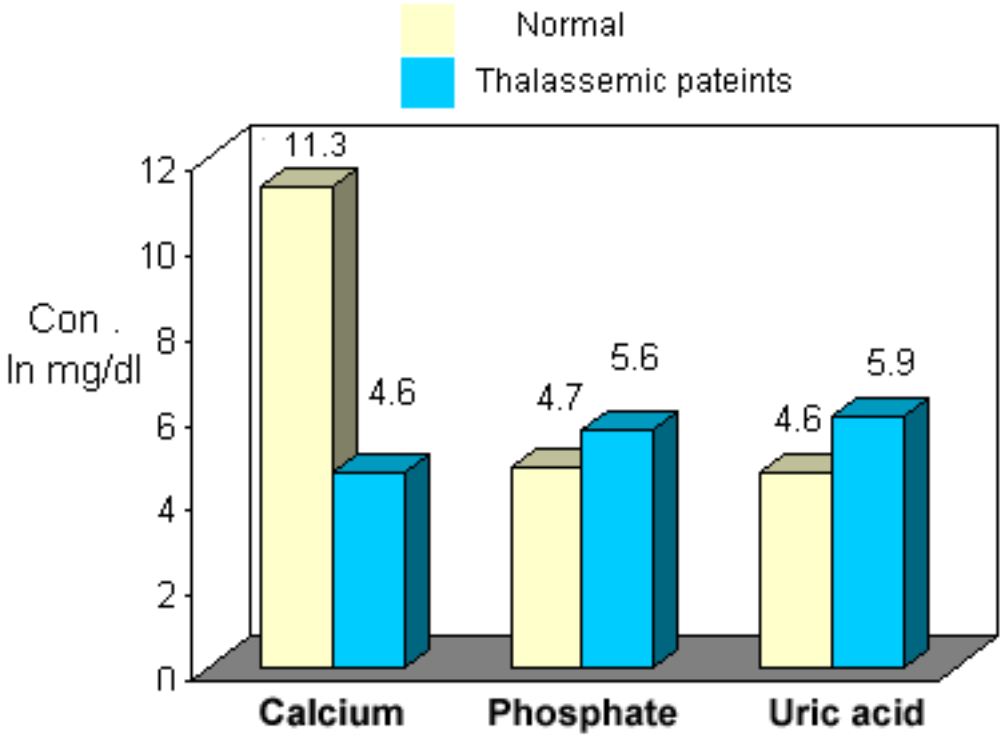
Table (1):- The host information of ß-thalassemiac patients and reference group

Groups	Total Number	Numbers		Age (years)	
		Male	Female	Mean ±S.E	Range
Group I	30	14	16	12.2±1.1	1-17
Group II	30	12	18	11.93±1.1	1-16

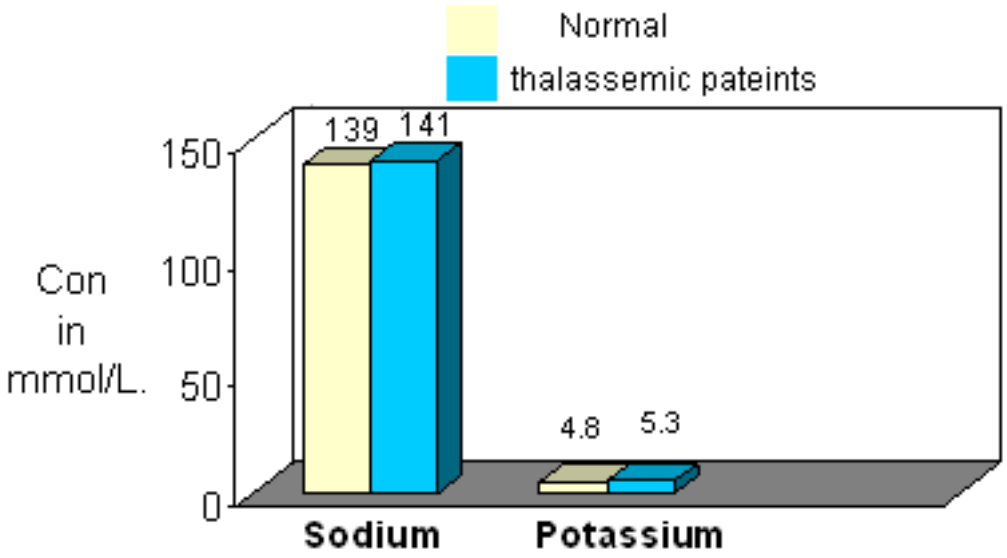
Table (2): Biochemical parameters of the studied group

Parameters	Unit	Normal		Patient		Statistical evaluation
		Range	Mean±S.E	Range	Mean±S.E	
Potassium	mmol/L	3.2-6.4	4.8±0.1	3.6-7.5	5.3±0.2	P<0.05
Sodium	mmol/L	122-150	139±1.5	122-159	141±1.6	N.S
Calcium	mg/dl	8.7-15	11.3±0.3	2.4-6.6	4.6±0.2	P<0.01
Phosphate	mg/dl	1.1-8	4.8±0.3	3.5-9.4	5.6±0.3	N.S
Uric acid	mg/dl	2.8-8.6	4.6±0.2	3.8-91	5.9±0.3	P<0.01
Hb	g/dl	13.9-8	11±0.1	8.4-4.8	7.5±0.2	P<0.01
Age	years	1-17	12.2±1.1	1-16	11.93±1.1	N.S

Figure(1): Serum sodium and potassium in normal and ß-thalassemic patients



Figure(2): Serum total Calcium, Phosphate and Uric acid in normal and ß- thalassemic patients



Incidence and Types of Eye Injuries in Patients with Major Trauma

ABSTRACT

Objectives: Finding the relationship and the association between ocular injuries and major trauma, and determining the incidence and causes of ocular injuries when there is an associated facial fracture.

Methods: A prospective study in multiple hospitals in Jordan, from June 2005 to December 2007, analyzing data taken from 190 patients with major trauma.

Results: Of the 190 patients with major trauma, 17 (11.2%) patients had associated ocular injuries and 37 (19.5%) patients had a facial fracture (zygoma, orbit or maxilla). The risk of an eye injury for a patient with a facial fracture is 5 times that for a patient with no facial fracture (95%, confidence interval 4.3 to 5.6). Of the patients with major trauma and an eye injury, 78.2% were men, and the median age was 32 years. 64.7% of ocular injuries were due to road traffic accidents (RTAs).

Conclusions: The incidence of ocular injuries in patients with major trauma is low, but considerable association was found between eye injuries and facial fractures. Young adults have the highest incidence of ocular injury. RTAs are the leading cause of ocular injuries in patients with major trauma. It is vital that all patients with major trauma include the face to be examined specifically for an ocular injury.

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Key words: ocular injuries, trauma, incidence, facial fracture.

Introduction

Worldwide, an estimated 1.6 million people are blind as a result of eye injuries, and a further 19 million have monocular blindness or low vision due to eye trauma[1]. Eye injuries in association with major trauma are particularly important as these injuries have a high risk of threatening vision[2]. Even minor eye injuries can cause considerable morbidity and time lost from work[3].

Eye injuries in association with major trauma can cause diagnostic difficulties, because patients with a reduced conscious level may not report visual symptoms, and assessment of the eye can be difficult in a supine patient. Eye injuries may be associated with facial injuries: in patients with periorbital haematomas and swelling, it may not be possible to see the eye properly at the initial examination and treating life-threatening injuries will be a priority in a patient with multiple injuries, but the possibility for vision loss due to ocular trauma should not be forgotten.

Although penetrating eye injuries from road traffic accidents (RTAs) have decreased considerably after seatbelt legislation and the introduction of laminated windscreens[4], little is known about the current epidemiology of ocular injuries in patients with major trauma, especially in Jordan. To investigate this group of patients, we performed a prospective study of 190 patients having major trauma, looking at the incidence of ocular injuries, and their association with facial fractures.

Methods and Materials

The study collected data on patients attending the emergency department in three hospitals in Jordan (Prince Rashid Bin Al-Hussien Hospital, Prince Zaid Bin Al-Hussien Hospital and King Hussein Medical Hospital), those patients had an injury resulting in an immediate admission to the hospital for =3 days, or admission to an intensive care unit. We excluded patients aged >65 years with an isolated fracture of the femoral neck or pubic ramus and those with single uncomplicated limb injuries. Patient information was recorded at the time of discharge.

The evaluation method was by using the Injury Severity Score (ISS). An ISS of 16 is predictive of a mortality of about 10%, and this defines major trauma based on anatomical injury[5].

Major trauma was defined as ISS >15. We examined the data for all patients who had sustained an eye injury, injury to the second, third, fourth or sixth cranial nerve, or a facial fracture (maxilla, zygoma or orbit) between June 2005 and June 2008.

Results

Among the 190 patients with major trauma, 17 (11.2%) patients had associated ocular injuries and 37 (19.5%) patients had a facial fracture (zygoma, orbit or maxilla). Of the patients with major trauma and an eye injury, 78.2% were men, and the median age was 32 years. The median ISS was 26.

These 17 patients had 31 eye

injuries (Table 1). Blunt trauma was responsible for 13 (76.4%) injuries and 4 (23.6%) injuries were the result of penetrating trauma.

Among the 190 patients with major trauma, 37 (19.5%) had a facial fracture (zygoma, orbit or maxilla), and 4 (10.8%) of these patients also had an eye injury. Of the 190 patients without a facial fracture, 4 (2.1%) patients had an eye injury. So the risk of an eye injury for a patient with a facial fracture is 5 times more than that for a patient with no facial fracture (95% confidence interval (CI) 4.3 to 5.6).

Discussion

In this study, (11.2%) of patients with major trauma have associated ocular injuries; this is close to some results found in previous studies. A study in Washington, DC, in 1982-88 found that 13.5% of patients with major trauma had associated ocular injuries[6]. The use of seat belts during the study period was not recorded, although it is likely to have been low and this will have contributed to the higher percentage of eye injuries. A more recent Australian study (1990-1997) found the incidence of injuries affecting the eye, adnexae, orbit and anterior visual pathways in patients with major trauma was 16%[2]. Our lower incidence of ocular injury may be at least partly explained by different inclusion criteria. Both of these studies included adnexal injuries, whereas we only included tear duct lacerations. We counted orbital fractures as facial fractures, unlike the Australian study, which grouped them with ocular injuries[2].

We can see that this study may underestimate the incidence of eye injuries, because relatively minor eye injuries may be missed in patients with major, life-threatening trauma. In this study, the most common ocular injuries involved (in descending order) the cornea, iris, conjunctiva and sclera. Facial fractures are commonly associated with ocular injury, although most patients with an eye injury do not have a facial fracture. Patients with a fracture of the maxilla, zygoma or orbit are five times as likely to have sustained an eye injury compared to patients without a facial fracture. Maxilla fractures are most common, but the proportion of eye injuries associated with each fracture was similar.

An association between facial fractures and visual impairment has been well documented[7].

Several papers report that the highest incidence of severe ocular injury occurs in patients with mid-facial fractures caused by RTAs, although some of the populations studied had low seatbelt usage[8]. Another study found that most patients with mid-facial fractures had evidence of an eye injury, and 27% sustained a moderate or severe eye injury[9]. Impairment in visual acuity was the most sensitive single predictor of ocular injury. Other factors associated with an increased risk of ocular injury in the case of facial injuries can be remembered by the acronym BAD ACT: Blow-out fracture, Acuity, Diplopia, Amnesia, Comminuted Trauma[10].

RTAs still cause a large proportion of ocular injuries in patients with major trauma (64.7% in our study). This is similar to the US study where motor vehicle crashes accounted for 52.1% of injuries[6].

Major trauma and associated ocular injuries are three times more common in men as in women, and young adults are at greatest risk. Visual impairment in the active years of life will be particularly devastating, delaying rehabilitation and having serious vocational and economic consequences[1,11].

Conclusion and Recommendation

Early recognition of eye injuries in patients with major trauma is important as urgent treatment of injuries, such as retinal detachments and intraocular foreign bodies, may save vision.

All patients with major trauma should be examined for evidence of eye injury, with particular attention to patients with facial injuries and those involved in RTAs.

Visual acuity should be measured where possible, and the pupils and ocular movements should be examined.

Computed tomographic scans of the orbit can be a helpful adjunct to clinical examination. They are especially useful for diagnosing orbital fractures and optic nerve injuries, but can also show ocular soft-tissue injuries.

References

1. *Nigrel A-D, Thylefors B. The global impact of eye injuries. Ophthalmic Epidemiology 1998; 5: 143-169.*
2. *Poon A, McCluskey PJ, Hill DA. Eye injuries in patients with major trauma. J Trauma 1999; 46: 494-499.*
3. *Schein OD, Hibberd PL, Shingleton BJ. The spectrum and burden of ocular injury. Ophthalmology 1988; 95: 300-305.*
4. *Johnston PB, Armstrong MFJ. Eye injuries in Northern Ireland two years after seat belt legislation. Br J Ophthalmol 1986; 70: 460-462.*
5. *Yates DW. ABC of major trauma. Scoring systems for trauma. BMJ 1990; 301: 1090-1094.*
6. *Sastry SM, Paul BK, Bain L, et al. Ocular trauma among major trauma victims in a regional trauma centre. J Trauma 1993; 34: 223-226.*
7. *Guly CM, Guly HR, Bouamra O, Gray RH, Lecky-FE. Ocular injuries in patients with major trauma. Emerg Med J 2006; 23: 915-917.*
8. *Ashar A, Kovacs A, Khan S, et al. Blindness associated with midfacial fractures. J Oral Maxillofac Surg 1998; 56: 1146-1150.*
9. *Al-Qurainy A, Stassen LFA, Dutton GN, et al. The characteristics of midfacial fractures and the association with ocular injury: a prospective study. Br J Oral Maxillofac Surg 1991; 29: 291-301.*
10. *Al-Qurainy A, Titterington DM, Dutton GN, et al. Midfacial fractures and the eye: the development of a system for detecting patients at risk of eye injury. Br J Oral Maxillofac Surg 1991; 29: 363-367.*
11. *Garcia TA, McGetrick BA, Janik JS. Spectrum of ocular injuries in children with major trauma. J Trauma 2005; 59:169-174*

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When to Label White-Coat Syndrome

ABSTRACT

Studies suggest that about 10% of patients may experience white-coat syndrome. The cause of the syndrome is unclear but may be a conditioning phenomenon.

This study was conducted on 240 patients recorded in the family practice clinic, in the Royal Jordanian Air Force medical facility. Patients were selected according to the discordance in blood pressure readings (by doctor, nurse and home measurements), during a period of three years (January 2000- January 2003), and numbered 220 males and 20 females, aged 30-60 years, with mean age of the patients (42.3). It was conceived to evaluate the management of White coat syndrome patients.

In our study, we referred all patients to King Hussein Medical Center for cardiac consultation to confirm the white-coat syndrome, by using a 24-hour ambulatory blood pressure monitor.

Out of 240 patients, 60 patients were labeled hypertensive (25%) of cases, the rest of the patients were kept on follow up as white coat syndrome; (16.7%) of the cases were found to have bad blood pressure monitors at home.
The best way to diagnose hypertension when in doubt with white coat syndrome , is accomplished by using a 24-hour ambulatory blood pressure monitor.

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Introduction

White coat syndrome (hypertension) refers to individuals showing a rise in blood pressure to a hypertensive level when measured by physicians, but remains normal when measured by the nurses or at home[1]. The cause and clinical implications of the white coat syndrome are unclear and the subject of an ongoing debate[2]. Anxiety of early visits to the physician's office is "learned" and subconsciously repeated during subsequent visits. Studies suggest that for patients with white coat hypertension, the heart disease risk is between that of patients with true hypertension and patients with normal blood pressure[3]. That is, cardiovascular risk is increased, but is not as high as someone with sustained hypertension.

The white coat effect is important in diagnosing and assessing control of hypertension in primary care[4]. This is best accomplished by using ambulatory blood pressure monitoring[5], which will periodically measure and record the blood pressure outside the physician's office. If the blood pressure is normal in this ambulatory assessment, it would be consistent with white coat syndrome. Also, we must ask the patients to check their home blood pressure monitor. If it is accurate, it could be used to document out-of-office blood pressure levels. If white-coat hypertension is confirmed, we generally rely on the home assessments to guide therapy.

There is no evidence that treating patients with white coat syndrome increases risk, but this possibility has not been studied at length. Initiation and maintenance of treatment for white coat syndrome represents an enormous opportunity and cost for health professionals and for patients, in addition to the unnecessary anxiety and side effects[6,7], Also some of the patients have symptoms of excessively reduced blood pressure, like light-headedness when rising from a chair, or unusual fatigue or tiredness, which necessitates stopping medication.

But according to other studies, all patients must be monitored because white coat syndrome has also shown to advance frequently into sustained hypertension in the future life of the patient[8].

Methods

In the Royal Jordanian Air Force medical facility, a retrospective study of the family practitioner clinic records was done; 240 patients were recorded as having discordance in blood pressure readings between (physicians, nurses, and home readings) during a period of three years (January 2000- January 2003), 220 males and 20 females, aged 30-60 years, mean age of the patients (42.3).

As a standard definition of white coat syndrome is lacking, we classed

subjects as normotensive if their blood pressure was <140/90mm Hg measured by a technician and <160/95 mm Hg measured by a physician[2,9,10]. These cut off values were taken according to WHO criteria for normotension, borderline hypertension, and sustained hypertension[11]. A case definition was set up for any patient in whom we found discordance in blood pressure readings. We asked them to bring their blood pressure monitors for check-up, then a one week, twice daily, follow up of blood pressure readings was undertaken (by physicians, nurses, home monitors). After analyzing data, all patients were referred to King Hussein Medical Center for cardiac consultation and ambulatory blood pressure monitoring.

Results

All patients were detected, diagnosed, and managed in the family practice clinic, in the Royal Jordanian Air Force Medical Center. Out of 48,000 patients seen in the family practice clinic in the period of one year, 240 patients (0.5%) were found to have white coat syndrome.

Table 1 Shows that the highest number of patients was in age group (41-50) years, accounting for 45.8% of the cases; however the lowest number was among age group (51-60) years, because the majority of our patients are on duty air force personnel.

Male patients were 91.7% of cases while females 8.3%, due to the constitutional nature of the air force personnel, as shown in Table 2.

Table 3 shows that the majority of cases were discovered during a routine annual medical checkup - 50%, while 20.8% of cases were found to have high blood pressure readings incidentally during a physical examination for other medical problems. On the other hand only 70 patients were complaining of symptoms of hypertension.

Table 4 demonstrates that after investigations, and using the 24 hour ambulatory blood pressure monitor, 75% of the cases were labeled as white coat syndrome patients, only 60 patients were labeled hypertensive. False low blood pressure readings due to bad blood pressure monitors at home, was the cause in 40 cases.

Discussion

Hypertension is perhaps the most common reason for initiation of lifelong drug treatment and ongoing management by doctors, because hypertension results in secondary organ damage and reduced life span, it should be evaluated fully and when appropriate treated[12].

In order to establish the diagnosis of hypertension, it is necessary to document in the course of several examinations that the arterial blood pressure remains elevated[12]. In our study we allowed one week of repeated measurement of blood pressure to establish the diagnosis of hypertension versus white coat syndrome.

Many definitions of the white coat syndrome exist[1,2,13], but we worked out our patients according to the definition used by many other studies[3,9,10], based on WHO criteria[11].

The prevalence of white coat syndrome in our study was 0.5% which is low in comparison with other studies where it was about 10%[3]. This may be due to the group quality in our study (young, healthy, air force personnel), while M. Matangi et al, found that the prevalence of white coat syndrome is 4.7% in patients referred for specific blood pressure problems[13].

In our study we detected 40 devices used by patients for home blood pressure measurement, with false readings, while many devices have failed to meet minimum standers for accuracy and reproducibility in other studies[14]. In other studies, home measurement at the moment is less reliable but is easier and cheaper[15].

We found that ambulatory blood pressure monitoring was the best way to establish the diagnosis, as also found in other studies[3,4,5,15].

In our study, after cardiological consultation, no cardiac involvement was detected, but in another study[3] their was an association between white coat syndrome and an increase in left ventricular mass and an increased prevalence of left ventricular hypertrophy.

Conclusion

Physicians in primary care clinics must be aware of the white coat syndrome in the diagnosis and follow-up of hypertension.

The best way to diagnose hypertension when in doubt of white coat syndrome, is accomplished by using a 24-hour ambulatory blood pressure monitor.

References

1. *Mancia G, Pevali G, Pomidossi G, et al. Alerting reaction and rise in blood pressure during measurement by physician and nurse. Hypertension 1987;9:209-215.*
2. *Mancia G, Zanchetti A. White coat hypertension: misnomers, misconceptions, and misunderstandings. What should we do next? J Hypertens 1996; 14:1049-1052.*
3. *Muscholl M.W, Hanse H.W, Bockel U, et al. Changes in left ventricular structure and function in patients with white coat hypertension: cross sectional survey. BMJ, 1998 August 29; 317(7158): 565-570.*
4. *Little P, Barnett J, Bansley L, et al. Comparison of agreement between measures of blood pressure in primary care and daytime ambulatory blood pressure, BMJ 2002 August 3; 325(7358): 258- 263.*
5. *Pickering T.G. Ambulatory blood pressure monitoring. Curr hypertens Rep 2002; 2: 558-564.*
6. *Marteau T. Reducing the psychological costs. BMJ 1991; 301: 26-28.*
7. *Medical Research Council Working Party on Mild Hypertension. Adverse reaction to propranolol and bendrofluazide for the treatment of mild hypertension. Lancet 1981; 2: 539-543.*
8. *Bidlingmeyer I, Burnier M, Bindlingmeyer M, et al. Isolated office hypertension: a prehypertensive state? J Hypertens 1996; 327-32.*
9. *Cavallini M.C, Roman M, Pickering T, et al. Is white coat hypertension associated with arterial disease or left ventricular hypertrophy? Hypertension 1995;26: 413- 419.*
10. *Kuwajima I, Suzuki Y, Fujisawa A, Kuramoto K. Is white coat hypertension innocent? Structure and function of the heart in the elderly. Hypertension 1993; 22: 826-831.*
11. *Primary prevention of essential hypertension. Report of the World Health Organization Scientific Group. Geneva: WHO technical report 1983: 686.*
12. *Petersdorf R.G, Adams R.D, Braunwald E, et al. Harrisons principles of internal medicine, tenth edition, McGraw-hill book company-Japan. 1983; chap 29:174-176.*
13. *Matangi M, Angus D, Brouillard D. White coat systolic hypertension. Definition and prevalence by 24hr ambulatory blood pressure monitoring. Kingston Heart clinic Kingston, Ontario. Canadian cardiovascular congress 2001.*
14. *O'Brien E, Waeber B, Gianfranco P, et al, on behalf of the European Society of Hypertension Working Group on Blood pressure Monitoring. Blood pressure measuring devices: recommendations of the European Society of Hypertension. BMJ 2001; 322:531-536.*
15. *Aylett M.J. Ambulatory or self blood pressure measurement? Improving the diagnosis of hypertension. Oxford University press, Jou. Fam. Pract. 1994 11: 197-200.*

Table 1: Distribution of cases according to age

Age	30-40	41-50	51-60
No.	90	110	40
%	37.5	45.8	16.7

Table 2: Distribution of cases according to gender.

	Male	Female
No.	220	20
%	91.7	8.3

Table 3: Distribution of cases according to the cause for measuring blood pressure.

	Annual medical	Symptoms of hypertension	Other disease
No.	120	70	50
%	50	29.2	20.8

Table 4: Distribution of cases after investigation.

	Hypertensive	White coat syndrome
No.	60	180
%	25	75