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HEALTHY LIFESTYLE BEHAVIORS OF STUDENTS AT THE FACULTY OF EDUCATION

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Abstract: *This study was conducted for the purpose of evaluating the healthy lifestyle behaviors of students at the Faculty of Education. The study sample consisted of 300 students who receive education at the faculty of education. The "Socio-demographic features form" and "Healthy Lifestyle Behavior Scale II (HLBS)" were used in the data collection stage of the study. The data were analyzed in the SPSS 23 environment using number, mean, percentage, analysis of variance, t-test, and correlation analysis. The Kruskal-Wallis and Mann-Whitney U tests were used as nonparametric tests. In order for the study to be carried out, the ethics committee approval from Artvin Çoruh University Ethics Committee, written permission from the institution where the study was conducted, and verbal approval from the participants were obtained. According to the findings of the study, the students' point average for the HLBS was determined as 124.86 ± 1.092 points. The healthy lifestyle behaviors of students do not differ according to gender, family type, class, smoking, alcohol use and the presence of a chronic illness. However, as the number of individuals and siblings in the family increases, the healthy lifestyle behaviors of students decrease, and as the educational level of the mother and the economic level increase, the healthy lifestyle behaviors also increase. On the other hand, the educational level of the father is not related to the healthy lifestyle behaviors of students. In the light of the results of the study, it is suggested to carry out comparative studies with wider samples that examine the healthy lifestyle behaviors of students.*

Key words*: Healthy life behaviors, faculty of education students, health promotion.*

Note: This study was presented as an oral presentation at the International Artvin Symposium on October 18-20, 2018.

1. Introduction

As defined by World Health Organization, health is a "state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." However, if we make a functional definition of health rather than consider it as an abstract concept, we can define it as an essential state and right of people to lead individually, socially and financially efficient lives [1]. Being healthy is actually to upgrade the current well-being, which is only possible through maintenance and improvement of health [2]. Basic concepts in health maintenance and improvement are the change of behaviors and lifestyles [3]. The change of behaviors and lifestyles begins with the awareness and knowledge of individuals about their responsibilities regarding their own health and is learned and improved with health education [2]. Health education is one of the methods for teaching and reinforcing healthy lifestyle behaviors through behavior change in maintenance and improvement of health [3]. Healthy lifestyle behaviors (HLB) are defined as "behaviors that help individuals maintain and improve their own well-being". Healthy lifestyle behaviors are not only behaviors that prevent people from developing a disease and support them to be more healthy, but are also behaviors that improve their health/well-being throughout their lives [4, 1]. Healthy lifestyle behaviors include sufficient and balanced nutrition, stress management, regular exercises, moral development, interpersonal relationships and taking responsibility regarding maintenance and improvement of health [5]. Adoption of healthy lifestyle behaviors is possible through the change of knowledge, thoughts and values of individuals. Therefore, health education must be given due consideration. Teachers who have significant roles in children's education set an example with their professional responsibilities, social roles and lifestyles, have an influence on students with the education they provide and are role models for them [6]. Teachers are expected to possess adequate knowledge and practice with regard to health promoting behaviors, because an educator who does not care about his/her own health is not expected to care about other people's health and influence others thereon [7].

University life is a period when important changes occur in the lives of individuals. University education results in changes not only in vocational training but also in personality development, personal life and health behaviors. These changes are specifically important in terms of attitudes and behaviors in healthcare, because attitudes and behaviors of students regarding healthcare affect both themselves and their families and society. Health status of populations is measured by the majority of healthy individuals within the society [8, 9]. Healthy Introduction and practice of healthy lifestyle behaviors during university education significantly affects the attitudes and behaviors of teacher candidates in the future [9].

The students of faculty of education, in particular, are known to be influential in improving students' health when they start working as teachers. Also, the determination of good and poor health behaviors of students not studying in a health-related department may be helpful in development and implementation of curricula. This study was conducted to determine the healthy lifestyle behaviors of students of faculty of education and the factors affecting such behaviors.

2. Material and Method

2.1. Study Design: The study was designed as a descriptive study.

2.2. Study Location and Time: The study was conducted in 2017-2018 academic year in the Faculty of Education of Artvin Coruh University.

2.3. Study Universe and Study Sample: The study universe consisted of 1003 students of the Faculty of Education. The sample size calculation formula (Nt^2pq / $d^2(N-1) + t^2pq$) was used to determine the

sample size of the study [10]. According to the calculation, the minimum sample size to be selected was determined as 278 in a universe of 1003 individuals with 5% error margin and 95% confidence. However, since this is the minimum value, a higher number of students were selected and 318 students were included in the study. Since some students failed to answer all questions in the questionnaire, the study sample consisted of 300 students.

2.4. Data Collection: Study data were collected by lecturers known by the students but otherwise irrelevant to the study to avoid bias toward the study. After the aforementioned lecturers were informed on the study content and questionnaires, data collection process started. Average time to fill questionnaires was determined as 5 minutes.

2.5. Data Collection Tools: For data collection, "Socio-demographic characteristics form" and "Healthy Lifestyle Behaviors Scale II (HLBS)" were used.

2.5.1. Socio-Demographic Characteristics Form: It is a form to inquire about socio-demographic characteristics of participants.

2.5.2. Healthy Lifestyle Behaviors Scale II (HLBS):

The scale was developed by Walker et al. (1987) and revised in 1996 (Walker et al., 1996). It measures health promoting behaviors of individuals in association with their healthy lifestyle [11, 12]The scale consists of a total of 52 positive items and has 6 subscales. The subscales include moral development, health responsibility, physical activity, nutrition, interpersonal relationships and stress management. The overall score received from the scale is the healthy lifestyle behaviors score. The rating scale is 4-point Likert type. The responses are never (1), sometimes (2), often (3), regularly (4). The lowest score for the entire scale is 52, while the highest score is 208. Turkish validity and reliability studies of the scale were conducted by Bahar et al. (2008) and its Alpha reliability coefficient is 0.92. In the present study, Alpha reliability coefficient is determined as 0.91 [13].

2.6. Data Assessment: Data were assessed in SPSS 18.0 software. Number, mean and percentage values were used for descriptive data. Variance analysis and t-test were used as parametric test and Kruskal Wallis and Mann-Whitney U tests were used as non-parametric test for the detection of differences and Correlation analysis was used for the detection of relationships.

2.7. Ethical Aspects of the Study: For this study, the approval of Artvin Coruh University Ethical Committee, a written permission from the institution where the study was conducted and the verbal consent of participants were provided.

3. Findings

Table 1. Averages of students' HLBS II and scale sub-dimensions

Scale and scale sub-dimensions	n	Min	Max	Average	Ss
Health responsibility sub-dimension		9	32	19.82	.254
Physical activity sub-dimension		8	32	16.44	.287
Nutrition sub-dimension		9	32	19.66	.236
Sub-dimension of spiritual development	300	14	35	25.24	.257
Interpersonal relationships sub-dimension		12	35	24.74	.257
Stress management sub-dimension		11	32	18.95	.206
HLBS II		78	183	124.86	1.092

HLBS “health responsibility subscale” mean score of students was 19.82 ± .254, “physical activity subscale” mean score was 16.44 ± .287. “Nutrition subscale" mean score was 19.66 ± .236, “moral development subscale” mean score was 25.24 ± .257, “interpersonal relationships subscale” mean score was 24.74±.257 and “stress management subscale” mean score was 18.95 ± .206. Mean HLBS score of students was calculated as 124.86 ± 1.092.

Table 2. The averages and differences of HLBS II according to some variables

		n	%	X	Ss	Significance
Gender	Male	196	65.3	124.90	1.382	t:.052
	Woman	104	34.7	124.79	1.777	p>0.05
Family type	Core	219	73	124.57	1.270	t:-.437
	Broad	81	27	125.64	2.145	p>0.05
Class	1	108	36.0	125.33	1.705	
	2	71	23.7	126.89	2.255	F:.612
	3	43	14.3	122.63	3.199	p>0.05
	4	78	26.0	123.58	2.194	
Cigaret	YeS	59	19.7	122.41	2.408	KW:1.055
	No	218	72.7	125.65	1.281	p>005
	Sometimes	23	7.7	123.65	4.192	

Alcohol	Often	20	6.7	115.70	3.505	KW:5.153 p>0.05
	No	256	85.3	125.90	1.197	
	Sometimes	24	8.0	121.33	3.446	
chronic	Yes	23	7.7	123.91	3.828	MW-U:3159
disease	No	277	92.3	124.94	1.141	p>0.05

Mean HLBS scores of men were 124.90 ± 1.382 and those of women were 124.79 ± 1.777, and the difference was found to be statistically insignificant. It is inferred from this finding that there was no difference between men and women in terms of healthy lifestyle behaviors. Participants with elementary families had a mean HLBS score of 124.57 ± 1.270 and those with larger extended families had a mean HLBS score of 125.64 ± 2.145, and the difference was found to be statistically insignificant. It is inferred from this finding that there was no difference between individuals with elementary family type and extended family type in terms of healthy lifestyle behaviors. Mean HLBS scores of students according to their grades demonstrate that mean scores of students in 1st, 2nd, 3rd and 4th grades are 125.33 ± 1.705 points, 126.89 ± 2.255 points, 122.63 ± 3.199 points and 123.58 ± 2.194 points respectively, and these scores were statistically similar. It is concluded from this finding that healthy lifestyle behaviors of students did not differ according to the grade. Regular smokers had a mean HLBS score of 122.41 ± 2.408, occasional smokers had a mean score of 123.65 ± 4.192 and non-smokers had a mean score of 125.65 ± 1.281. Although non-smokers had higher mean HLBS score than occasional smokers, and occasional smokers had higher score than regular smokers, the differences were statistically insignificant. Smoking behaviors of students had no effect on their healthy lifestyle behaviors. Frequent alcohol consumers had a mean HLBS score of 115.70 ± 3.505, occasional alcohol consumers had a mean score of 121.33 ± 3.446 and non-consumers had a mean score of 125.90 ± 1.197, and the difference was found to be statistically insignificant. Alcohol consumption behaviors of students were detected to have no effect on their healthy lifestyle behaviors. Students with chronic diseases had a mean HLBS score of 123.91 ± 3.828 while students with no chronic diseases had a mean score of 124.94 ± 1.141, and the difference was insignificant. Presence or absence of a chronic condition had no impact on their healthy lifestyle behaviors.

Table 3. The relationship between some demographic characteristics of the students and HLBS II

Variable	**n**	**r**	**r2**	**Significance**
Number of siblings		-.176	.03	p<0.05
Number of individuals in the family		-.155	.02	p<0.05
Mother education level	300	.123	.02	p<0.05
Father education level		.104	.01	p>0.05
Economic level		.201	.04	p<0.001
Health perception		.316	.10	p<0.001

A negative, low correlation was found between the number of siblings and mean HLBS scores of students. The higher the number of siblings of students were, the fewer healthy lifestyle behaviors the students had. A negative, low correlation was detected between the numbers of family members and mean HLSB scores of students. As the number of students' family members increased, their healthy lifestyle behaviors decreased. A positive, low correlation was found between mothers' educational level and mean HLBS scores of students. As the mothers' educational level increased, healthy lifestyle behaviors of students also increased. Although mothers' educational levels had an effect on healthy lifestyle behaviors of students, no statistically significant correlation was detected between fathers' educational levels and mean HLBS scores of students. A statistically positive, moderate correlation was observed between economic statuses and mean HLBS scores of students. As the economic status of students increased, their healthy lifestyle behaviors also increased. The correlation between the health perception and mean HLBS scores of students was low and positive. As the health perception of students increased, their healthy lifestyle behaviors also increased.

4. Discussion

In the present study, healthy lifestyle behaviors of students studying in a faculty of education are investigated. Healthy Lifestyle Behaviors are calculated as health responsibility subscale, physical activity subscale, nutrition subscale, moral development subscale, interpersonal relationships subscale, stress management subscale and HLBS scores. According to the scale, as the scores of students get closer to the upper limit, their healthy lifestyle behaviors increase. The lowest obtainable HLBS score is 52 and the highest score is 208. In this study, HLBS scores of students were 78 at the lowest level, 183 at the highest level and the mean score was 124.86 ± 1.092 (Table 1). HLBS scores of students are close to average and similar with the results of studies conducted in other departments of universities [9, 14, 15]. Higher mean scores were obtained in studies with nursing students [16, 17], a study with students in science teaching department [7] and a study with mixed gender group of students [18]. This may be due to the course contents involving health improvement in nursing departments. In a study in Hong Kong, mean HLBS scores were observed to be lower (119.85) compared to our country [19]. Mean scale scores were found to be 125.76 in study conducted in the USA with Japanese students [20]. As evidenced by these studies, mean HLBS score is generally close to average. This may result from the fact that students do not receive adequate training on how to improve and maintain their health or are unable to transfer the theoretical knowledge into practice due to other reasons. Especially since nurses and teachers are role models in terms of healthy behaviors, they may set examples by adopting these behaviors throughout their education.

Subscale scores show that the highest mean scores are in ‘moral development (25.24 ± .257) and interpersonal relationships 24.74 ± .257)’ subscales, while the lowest mean scores are in ‘physical activity’ (16.44 ± .287) subscale (Table 1). Many studies produced similar results. Karadeniz et al. (2008); Akgün Kostak et al. (2014); Yurdataman et al. (2014) obtained similar results in their respective studies. In a study by Tokuç et al. (2007), moral development and health responsibility subscale scores were found high followed by interpersonal relationship subscale score. In the present study, the highest mean score obtained in moral development and interpersonal support subscales indicates that students build relationships with others by sharing their thoughts and sentiments through verbal and non-verbal messages. High mean scores obtained in these two subscales can be assessed as a positive result for

teacher candidates in performance of their future professions. Low scores in physical exercise subscale demonstrates that students have not established the positive habit of physical exercise or transferred it into practice.

Mean HLBS scores of students according to some variables show that gender, family structure, grade, smoking/alcohol consumption and presence of a chronic condition had no impact on healthy lifestyle behaviors of students (Table 2). It was observed in other studies that students who stated to have a good perception of health, female students and 3rd-4th grades, had higher and more significant scores than male students and 1st-2nd grades [9, 18, 21, 16, 8].

On the other hand, although the difference was statistically insignificant, non-smokers had higher mean HLBS scores (125.65 ± 1.281) than occasional smokers (123.65 ± 4.192), and occasional smokers had higher HLBS scores (122.41 ± 2.408) than regular smokers. Similarly, frequent alcohol consumers had a mean HLBS score of 115.70 ± 3.505, occasional alcohol consumers had a mean score of 121.33 ± 3.446 and non-consumers had a mean score of 125.90 ± 1.197, and the difference was found to be insignificant. Some studies suggest that smoking and alcohol consumption behaviors have no effect on developing healthy lifestyle behaviors [9]. This suggestion may be due to the fact that smoking and alcohol consumption behaviors are infrequent among students. In a similar study, mean scores of non-smokers were found high and significant compared to other students [14, 7, 15].

A negative, low correlation was detected between the number of siblings and family members and mean HLBS score of students (Table 3). As the number of siblings and family members of students increased, their healthy lifestyle behaviors decreased. The effect of higher number of family members on mean HLBS score can be explained by economic factors. It is also thought that higher number of family members negatively affect the behavior of taking care of their own health. In a study with adolescents, it was observed that mean HLBS score decreased as the number of siblings increased [22]. As opposed to this finding, it was detected in another study that family size had no impact on HLBS score [23, 22]. In a study with nurses, individuals with large families had higher mean HLBS scores [24]. Similarly, students living with their parents had higher mean HLBS scores [25].

A positive, low correlation was found between mothers' educational levels and mean HLBS scores. As the mothers' educational level increased, healthy lifestyle behaviors of students also increased. Studies are available indicating that mothers' educational level is effective in the development of healthy lifestyle behaviors [8, 26]. Mothers with high educational levels are role models for children in terms of taking responsibility of their own health. However, the study did not reveal a statistically significant correlation between fathers' educational level and mean HLBS scores. It is thought that this may be due to the fact that mothers traditionally assume more responsibilities in children's education and health maintenance or acting as role models. There are also studies demonstrating that mother or father's educational status has no effect [9]

A statistically positive, moderate correlation was found between economic status and mean HLBS scores of students (Table 3). As economic status of students improved, their healthy lifestyle behaviors also increased. This is a natural and expected result. In general, individuals with low socioeconomic status are deemed to be disadvantageous in terms of developing healthy behaviors. High economic status is considered to enhance the extent to which individuals adopt healthy behaviors. Economic status are highly effective in terms of developing healthy behaviors, particularly nutrition behaviors. In parallel with this study, similar results were obtained in other studies as well [8, 27, 9, 26]

A positive, low correlation was detected between health perceptions and mean HLBS scores of students. Healthy lifestyle behaviors of students increased as their positive perception of health increased (Table 3). Numerous studies are in line with this study. It can be said that individuals with good perception of their health are more careful about exhibiting healthy lifestyle behaviors. Studies in the literature also support this study [14, 15].

5. Results and recommendations

Mean HLBS score of students was found to be 124.86 ± 1.092. No difference was detected between men and women in terms of healthy lifestyle behaviors. Healthy lifestyle behaviors of students did not differ according to family type and grade variables. Although non-smokers had higher mean HLBS score than occasional smokers and occasional smokers had higher mean HLBS score than regular smokers, differences were statistically insignificant. Furthermore, alcohol consumption of students was found to have no effect on healthy lifestyle behaviors. Presence or absence of a chronic condition had no impact on healthy lifestyle behaviors.

A negative, low correlation was found between the number of siblings and family members and mean HLBS scores of students. As the number of siblings and family members of students increased, their healthy lifestyle behaviors decreased. No statistically significant correlation was detected between fathers' educational level and mean HLBS score although healthy lifestyle behaviors of students increased as their mothers' educational level increased. A statistically positive, moderate correlation was detected between mean HLBS scores and economic status of students and a positive, low correlation was detected between health perception and mean HLBS scores of students.

In line with these results, it is recommended to conduct more advanced comparative studies on healthy lifestyle behaviors of students with larger sample sizes.

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HEALTHY LIFE-STYLE BEHAVIOURS AND EFFECTING FACTORS OF FINAL YEAR STUDENTS ATTENDING TO TWO DIFFERENT MEDICINE FACULTIES

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Abstract: *This study was carried out to determine and compare the Lifestyles of final year medicine faculty students attending two different universities. The population of this descriptive type study consists of final year students attending Dicle University Medicine Faculty (DUMF) and Van Yüzüncüyıl University Medicine Faculty (YYUMF). In 2018-2019 academic year, 166 and 84 intern students are attending to DUMF and YYUMF, respectively; hence, through this number, it is aimed to reach all population. In DUMF, 160 and in YYUMF, 62 were contacted. The students were informed; and they confirmed the consent form and a questionnaire containing descriptive information arranged by Walker. Turkish validity and reliability survey, Healthy Lifestyle Behavioural Scale, was carried out by Bahar et al. in 2008; and the students were given "Healthy Lifestyle Behavioural Scale II" (HLSBS-II), and they were asked to respond the questions. The mean of total scores of HLSBS in DUMF students is 127,85±19,1, while it is 121,42±18,7 in YYUMF students (p=0,04). According to sub groups of HLSBS, the scores that the students gained are as follows: The mean in health responsibility total score of DUMF students is 21,05±4,9, while it is 19,08±4,2 in YYUMF students(p=0,007). The mean in physical activity total score of DUMF students is 16,42±4,9, while it is 17,54±4,6 in YYUMF students (p=0,123). The mean in nourishment total score of DUMF students is 19,08±4,4, while it is 18,80±3,5 in YYUMF students (p=0665). The mean in spiritual development of DUMF students is 26,3±4,5, while it is 24,43±5,8 in YYUMF students (p=0,027). The mean in interpersonal relations of DUMF students is 24,94±4,5, while it is 23,10±3,6 in YYUMF students (p=0,005). The mean in stress management of DUMF students is 19,97±3,6, while it is 19,39±4,5 in YYUMF students (p=0,370). Total HLSBS score of the students whose family income is good is 130,85±17,5, while the total HLSBS score of the ones whose family income is bad is 113,76±18,8(p=0,004). While the total score of physical activity according gender is 17,52±4,9 for men which is higher than women with 15,39±3,8 (p=0,001), inter individual relation total point is*

higher with women (25,3±4,5) than man (23,91±4,2) (p=0,001). The fact that the medicine faculty students should lead healthy lifestyle behaviour is important due to the fact that they make a role model for not only themselves but for the society as well. It is thought-provoking that while in normal circumstances 204 score can be obtained from the scale, medicine faculty intern students have received an average of 127,85 score in HLSBS-II; and while in normal condition, it is possible to get 32 scores in the physical activity sub group; medicine students have received only 16,42 score. In order to make the individuals adopt healthy Lifestyle, the earlier the individuals are provided with education and opportunities, the healthier they will be.
Key words: *Healthy Lifestyle Behavioural Scale, spiritual development, stress management, physical activity, medical students.*

1. Introduction

Health understanding of our age aims to protect, continue and develop the health of the society. Healthy Lifestyle is defined as individual's controlling all behaviours which may influence his/her health and his choosing and arranging the daily activities appropriate for his/her health status [1]. Walker, Sechrit and Pender defined Healthy Lifestyle Behaviours (HLSB) as "multi-dimensional model of self-starting activities, perceptions serving to protect and improve the health level, realizing oneself as completion of individuality."[2]. The individual, who convert these behaviours into attitudes can not only protect his/her health but also continue her healthy status and also he/she can improve his/her health status to a better level. According to WHO data, the reason for 70-80% of the deaths in underdeveloped countries and 40-50% of the deaths in developed countries is the behaviours emerging from the life-styles of the individuals [3].

In Ottawa Charter (Ottawa Charter, 1986), one of the universal declarations about protection and improvement of health, improving health is defined as "it is the process of increasing the individuals control over their health and improving their health status"; therefore, improving health has been removed to be a responsibility belonging only to health sector, and thus preconditions for health and health improving policy tools have been established[4].

Improving health aims the betterment of general health status of the individual. However, healthy Lifestyle behaviours contribute to the improvement of health. The achievements obtained by internalizing of the healthy Lifestyle behaviours provide the individuals with consciousness that it is their responsibility to improve their Lifestyle and protect their health. As a result, individuals achieve health protecting and improving behaviours by avoiding risky behaviours that are or may be present in their own lives [5]. It is necessary that individuals be aware of health improving behaviours to convert health improving behaviours into wanted behaviours, and keep them under control, and make these behaviours their Lifestyle by sustaining them. The individual who change these behaviours into practice can not only continue his/her well-being but also carry his/her health status to a better level [6].

In a society, individuals pay importance to health staff in particularly their health protecting behaviours and adopt them as role models. On the other hand, one of the most important missions of health staff working at first stage health services in our country is to protect, improve the health of the society and provide the individuals with healthy Lifestyles [7]. For this reason, health staff primarily should adopt and practise health protecting and improving behaviours. Within this context, it essential

to evaluate the health Lifestyle behaviours of health employees; and that they should be developed wherever they have deficiencies [6].

Healthy Lifestyle Behaviours Scale (HLSBS) was developed by Walker, Sechrist and Pender to test health-improving model [8]. This tool measures health improving behaviours in relation with individual healthy Lifestyle. The scale, which has 6 sub-groups such as self-realization, health responsibility, physical activity, nourishment, interpersonal relation and stress management, consists of 48 items. In 1995, 4 items were added to the scale, so the items of the scale turned out to be 52. Each sub-group can be used independently. The total score of the scale gives the score of healthy Lifestyle behaviours [9]. The validity and reliability of HLSBS was performed by Esin in Turkey [10]. For total HLSBS, Cronbach Alpha consistency coefficient was found to be 0,91.

Self-Realization Sub-Group determines life aims and self-realization ability of the individual and how much he/she knows and satisfies himself/herself.

Health Responsibility Sub-Group determines the responsibility level of the individual over his/her health and to what extent he/she deals with it.

Physical Activity Sub-Group shows to what extent the physical activities, as an inevitable element of healthy life, are practised by the individual.

Nourishment Sub-Group determines the individual's choosing and arranging his/her meals and the changes in his/her food selection.

Interpersonal Sub-Group determines the communication and continuity level of the individual with his/her close environment.

Stress Sub-Group determines the individual's recognition level of stress sources and stress control mechanisms.

All items of Healthy Lifestyle behaviours scale are positive. For respond "Never" score is 1, for respond "Sometimes" score is 2, for respond "Often" score is 3, for respond "Regularly" score is 4 point is given. The lowest score for all questions of the scale is 52, while the highest is 208.

This study was carried out in order to determine and compare the healthy Lifestyle behaviours of the final year students attending to the medicine faculties of two different universities.

2. Method

The population of this study, which is in the sectional type, is composed of final year intern students attending Dicle University Medicine Faculty (DUMF) and Van Yüzüncüyıl University Medicine faculty (YYUMF). In 2018-2019 academic year, 166 and 84 intern students are attending DUMF and YYUMF, respectively. Therefore, by this way, it is aimed to reach all population of the study. In DUMF, 160(160/166) and in YYUMF, 62(62/84) students were contacted. The students were given a consent form. Together with this form, they were given a questionnaire containing descriptive information. Afterwards, the students were given and wanted to respond "Healthy Lifestyle Behaviours Scale II" (HLSBS-II), which was arranged by Walker, and whose Turkish validity and reliability investigation was performed in 2008. The participants who did not want to join in the survey and who did not fill in the descriptive information form and HLSBS-II questionnaire completely were excluded (total 28 student).

HLSBS-II is composed of 52 questions and six sub-groups including health responsibility (9 questions), physical activity (8 questions), nourishment (9 questions), spiritual development (9

questions), interpersonal relations (9 questions) and stress management (8 questions). The scale grading is in 4 Likert type, from this scale minimum 52 score and maximum 208 score can be attained. In the statistical data analyses, the percentage distribution of sectional data and means of constant data are calculated; and in chi-square and independent groups, t test is employed; and the means are given with standard deviation (Mean±SD), $p<0.05$ is evaluated as statistical significance.

3. Findings

The fact that medicine faculty students enjoy healthy Lifestyle behaviours is significant since they make models for the society. This study was conducted with the participation of final year students (interns) receiving education at Dicle University (DUMF) and Van Yüzüncü Yıl University Medicine faculties (YYUMF). The age average of DUMF students was found to be 24,6±1,6 (p=0,152) and the height average 172,4±7,7(0,329) and the weight average 69,9±11,3(0,7519); likewise, it turned out to be 25,9±4,5, 171,3±7,6 and 69,3±12,5 with YYUMF students, respectively.
In table 1, some of the demographical properties of the participants are given. Accordingly, 64,4% of DUMF students are male, while this rate is 59,7% with YYUMF students. While 65,6% of DUMF students are with their families; and 23,1% live in student house; and 11,3% accommodate in hostel, the rates for YYUMF students are 36,1%, 33,9% and 32,8% (p=0,001), respectively. According to their own words, the family economic status of DUMF students is 20,6% good, 73,8% medium and 5,6% bad, while the rates for YYUMF students are 19,4%, 71,0 and 9,7% (p=0,56), respectively.
The education status of the students' parents was investigated. Of DUMF students' mothers, 47,5% have not finished any school, 31,9% are primary school graduates, 11,9% are high school graduates and 8,8% are university graduates, while the rates for YYUMF students' mothers are 43,5%, 29,0%, 17,7% and 9,7%, respectively. As to fathers' education status, Of DUMF students' fathers, 23,8% have not finished any school, 23,1% are primary school graduates, 31,3% are high school graduates and 21,9% are university graduates, while the rates for YYUMF students' fathers are 12,9%, 33,9%, 25,8% and 27,4%, respectively.

58,1% of DUMF students have never smoked and 33,1% regularly smoke. On the other hand, the percentages for YYUMF students are 55,7% and 27,9% (p=0,24), respectively.
The Height-Weight-Index (HWI) of the students were investigated, according to the measurements, Of DUMF students, 2,5% were found to be thin, 70,6% normal weight and 26,9% fat, while no obese students were found. On the other hand, the measurements for YYUMF turned out to be 3,4%, 67,2%, 25,9, respectively. Obese rate was 3,4% (2 students).

Table 1. Dispersion of some demographic properties participating in the investigation

Property		**DUMF**		**YYUMF**		**Total**		
		Number	**%**	**Number**	**%**	**Number**	**%**	**P**
Gender	**M**	103	64,4	37	59,7	140	63,1	0,515
	F	57	35,6	25	40,3	82	36,9	
	Total	160	100,0	62	100,0	222	100,0	
Residence	**Family**	105	65,6	22	36,1	127	57,5	0,000
	Hostel	18	11,3	20	32,8	38	17,2	

	Student House	37	23,1	19	31,1	56	25,3	
Family Income Status	**Good**	33	20,6	12	19,3	45	20,2	P=0,557
	Medium	118	73,8	44	71,0	162	73,0	
	Bad	9	5,6	6	9,7	15	6,8	
Smoking Case	**Never tried**	93	58,1	34	55,7	127	57,5	P=0,246
	Still smoking	53	33,1	17	27,9	70	31,6	
	Used to smoke	14	8,8	10	16,4	24	10,9	
Mother's Education	**No School finished**	76	47,4	27	43,6	103	46,4	P=0,694
	Primary School Graduate	51	31,9	18	29,0	69	31,1	
	High School Graduate	19	11,9	11	17,7	30	13,5	
	University Graduate	14	8,8	6	9,7	20	9,0	
Father's Education	**No School Finished**	38	23,8	8	12,9	46	20,7	P=0,136
	Primary School Graduate	37	23,1	21	33,9	58	26,1	
	High School Graduate	50	31,3	16	25,8	66	29,8	
	University Graduate	35	21,8	17	27,4	52	23,4	
HWI	**Thin**	4	2,5	2	3,4	6	2,8	P=0,125
	Normal	113	70,6	39	67,3	152	69,7	
	Fat	43	26,9	15	25,9	58	26,6	
	Obez	0	0,0	2	3,4	2	0,9	

In Table 2, Healthy Lifestyle Behaviour Scale Mean Scores of the students are seen. Accordingly, the total HLSBS score mean of DUMF students is 127,85±19,1, while it is 121,42±18,7 for YYUMF students (p=0,04).

The scores that the students obtained according to sub-groups of scale for total score mean of health responsibility is 21,1±4,9 for DUMF students, while it is 19,1±4,2 for YYUMF students (p=0,007). The physical activity total score mean for DUMF students is 16,4±4,9, while it is 17,5±4,6 for YYUMF students (p=0,123). The nourishment total score mean for DUMF students is 19,1±4,4, while it is 18,8±3,6 for YYUMF students (p=0,67). The spiritual development total score mean for DUMF students is 26,3±4,5, while it is 24,4±5,8 for YYUMF students (p=0,012). The inter-personal relation total score mean for DUMF students is 24,9±4,5, while it is 23,1±3,6 for YYUMF students (p=0,002). The stress management total score mean for DUMF students is 20,0±3,6, while it is 19,4±4,5 for YYUMF students (p=0,321).

Table 2. The dispersion of total and sub-group HLSBS scores of the students participating in the study according to their faculties

	Faculty	N	Mean	Std. Deviation	Std. Error Mean	P
Total HLSBS score	DUMF	159	127,8553	19,09895	1,51465	0,04
	YYUMF	49	121,4286	18,72832	2,67547	
Health responsibility total	DUMF	160	21,0563	4,89930	,38732	0,007
	YYUMF	59	19,0847	4,23568	,55144	
Physical activity total	DUMF	160	16,4250	4,93932	,39049	0,123
	YYUMF	62	17,5484	4,60106	,58434	
Nourishment Total	DUMF	160	19,0875	4,44022	,35103	0,667
	YYUMF	56	18,8036	3,58998	,47973	
Spiritual Development Total	DUMF	160	26,3375	4,51118	,35664	0,012
	YYUMF	58	24,4310	5,85830	,76923	
Interpersonal relations total	DUMF	159	24,9434	4,50210	,35704	0,002
	YYUMF	60	23,1000	3,64854	,47102	
Stress management Total	DUMF	160	19,9750	3,62200	,28634	0,321
	YYUMF	61	19,3934	4,52135	,57890	

The scores of HLSBS for gender were calculated; and the results are given in Table 3. In accordance with the scores, The total mean score of HLSBS for males is 126,2±19,5, while it is 126,5±18,6 for females (p=0,911). The total mean score of health responsibility for males is 20,2±4,6, while it is 21,0±5,0 for females (p=0,251). The total mean score of physical activity for males is 17,5±5,0, while it is 15,4±4,4 for females (p=0,001). The total mean score of nourishment for males is 18,8±4,4, while it is 19,3±3,8 for females (p=0,356). The total mean score of spiritual development for males is 25,6±4,5, while it is 26,2±5,6 for females (p=0,436). The total mean score of inter-personal relations for males is 23,9±4,2, while it is 25,3±4,5 for females (p=0,021). The total mean score of stress management for males is 19,7±3,6, while it is 20,0±4,4 for females (p=0,539).

Table 3. The dispersion of total HLSBS and sub-group scores of the students participating in the study according to gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean	P
Total HLSBS score	M	129	126,2248	19,52132	1,71876	0,911
	F	79	126,5316	18,68555	2,10229	
Health responsibility total	M	138	20,2391	4,65849	,39656	0,251
	F	81	21,0123	5,02617	,55846	
Physical activity total	M	140	17,5286	4,97250	,42025	0,001
	F	82	15,3902	4,37940	,48362	
Nourishment	M	135	18,8074	4,43947	,38209	0,356

Total	F	81	19,3580	3,85781	,42865	
Spiritual Development Total	M	138	25,6304	4,53547	,38608	0,436
	F	80	26,1750	5,64066	,63065	
Interpersonal relations total	M	137	23,9124	4,19291	,35822	0,021
	F	82	25,3171	4,50481	,49747	
Stress management Total	M	139	19,6906	3,56889	,30271	0,539
	F	82	20,0244	4,39409	,48525	

The HLSBS score means of the students were examined according to their socio-economic status; and the results are given in Table 4. The total mean score of HLSBS for students whose economic status are good is 130,8±17,5, while it is 114,5±18,3 for the ones whose economic status is bad (p=0,004). The mean total of health responsibility for the ones whose economic status good is 20,6±4,4, while it is 17,8±3,8 for the ones whose economic status is bad (p=0,038). The mean total of physical activity for the ones whose economic status good is 18,3±4,5, while it is 12,7±34,1 for the ones whose economic status is bad (p=0,000). The mean total of nourishment for the ones whose economic status good is 19,6±3,9, while it is 16,5±3,4 for the ones whose economic status is bad (p=0,010). The mean total of spiritual development for the ones whose economic status good is 26,7±5,6, while it is 25,5±5,8 for the ones whose economic status is bad (p=0,487). The mean total of interpersonal relations for the ones whose economic status good is 24,8±4,1, while it is 20,1±3,1 for the ones whose economic status is bad (p=0,546). The mean total of stress management for the ones whose economic status good is 20,1±3,1, while it is 18,2±4,1 for the ones whose economic status is bad (p=0,063).

Table 4. The dispersion of total HLSBS and sub scores of students participating in the study according to economic status

	Economic Status	N	Mean	Std. Deviation	Std. Error Mean	P
Total HLSBS score	Good	41	130,8537	17,48651	2,73093	0,004
	Bad	14	114,5000	18,26619	4,88185	
Health responsibility total	Good	44	20,5682	4,36369	,65785	0,038
	Bad	15	17,8667	3,85202	,99459	
Physical activity total	Good	45	18,2889	4,50062	,67091	0,000
	Bad	15	12,8667	4,13809	1,06845	
Nourishment Total	Good	42	19,5952	3,90159	,60203	0,010
	Bad	14	16,5000	3,36841	,90024	
Spiritual Development Total	Good	43	26,7209	5,60750	,85514	0,487
	Bad	15	25,5333	5,82932	1,50512	
Interpersonal relations total	Good	44	24,8182	4,09352	,61712	0,546
	Bad	15	24,0000	5,58058	1,44090	
Stress management	Good	45	20,0889	3,08090	,45927	0,063
	Bad	15	18,2000	4,05674	1,04745	

Total						

4. Discussion

One of the most significant missions that submit responsibility at the first stage health services is to preserve and improve health of society and to provide the individuals with healthy Lifestyle behaviours[7]. In the education programs for society and especially in order to inform the individual, family and society in improving health, and to be able to perform the behavioural change, various methods are utilized. One of these is to be a model. Because of this, starting with the doctors working at first stage health centres, health professionals should primarily adopt health protecting and improving behaviours and then apply them in their lives. In this study, healthy Lifestyle behaviours of candidate doctors, who will make up the basic human power in conducting health services at first stage health centres, were evaluated during their internship period before they start to work. The students of two medicine faculties located in the Eastern and South-eastern regions of our country have similar defining properties such as age, gender, height average, economic status, parents' education status. However, according to the students' accommodation properties, while of the DUMF students 65,6% reside with their families, 23,1% live in student house, 11,3% stay at hostel, the rates for YYUMF students are 36,1%, 33,9% and 32,8%, respectively [p=0,001]. This difference can be connected with the fact that the province of Van has less population and there are not any medicine faculty in the neighbouring towns, and the students therefore prefer this medicine faculty.

The mean total HLSBS scores was found to be 127, 85±19, 1 for DUMF students, while it was 121,42±18,7 for YYUMF students (p=0,04). In literature, there are a number of studies related to the health workers and the students having medical education and training. The most recent study is the study carried out by Nacar [11]. This study is a multi-centred study that he performed in medicine faculty students. He found that the HLSBS of first class students of medicine faculty to be 129,2, while the final year students' score was 125,5. In the same study, the HLSBS mean scores of the students according to the faculties they attended were as follows: For Erciyes University students, it was 128.8±18.6; and for Gazi University students, it was 129.4±18.9; and for Konya Seljuk University students, it was 127.7±17.8; and for Eskişehir Osmangazi University students, it was 127.3±18.5; and for Ege University students, it was 126.7±17.2; and for Kahraman Maraş Sütçü İmam University students it was 124.5±18.7; and for Malatya İnönü University students it was 126,2±17,0. These scores appear to be closer to DUMF scores.

One of other studies related to the students having education and training in the field of health is the one carried out by Kurt [12]. In his study, Kurt found the HLSBS mean score of students attending Nursery and Midwifery department to be 123, 12 ± 16, 51. In his study, Şen [13] found 118,01±21,0 score with students of Health Services Vocational School. In his study, Cihangiroğlu [14] found 121,75±18,86 score with students of Health School.

In the studies carried out with Health Workers, Güner [15], in his study, found that total mean score HLSBS of nurses working in surgery room was 116, 89±16, 36. Akça [16], in his study, found that total mean score HLSBS of academicians was 133, 29±18, 16. Elvan and Türkol [1], in their study, found it to be 116,31±17,80. Gündoğdu and Güler [17], in their study performed with health workers working first stage health centre, found it to be 128±21,3. The results vary between 116 and 133. These scores were compared with the scores students according to sub groups of the scale.

The sub group, health responsibility, determines at what levels the individual participates in his health and the responsibility over his health. In this field, the students can be given 9 points at least and 36 points at most. Health responsibility total score for DUMF students was found to be 21,1±4,9, while it was 19,1±4,2 for YYUMF students (p=0,007). The total score of health responsibility for males turned out to be 20, 2±4, 66, while it was 21, 0±5, 02 for females (p=0,251). While the score for the ones whose family income was low appeared to be 20,6±4,4, the score for the ones whose family income was bad was found to be (17,9±3,85)(p=0,038). The differences between the groups are considerably significant. The total score of health responsibility in the other studies are as follows: In Güner's study it is found as 22, 5±5, 03, in Kurt's study it is 19.9±4.21, in Elvan's study it is 18.0±3.47 and in Şen's study it is 18, 8±3, 9.

Physical Activity Sub Group shows at what level physical activity applications, inevitable aspects of healthy life, are practised by individuals. There are 8 questions in this sub group, and the participants obtain scores between 8 and 32. The total score was found to be 16,4±4,9 with DUMF students, while it was 17,5±4,6 with YYUMF students. The score was 17,5±4,97 with male students, while it was 17,5±4,6 with female students (p=0,001). The score was found to be higher with the ones whose economic status was good than those whose economic status was bad with 18,3±4,50 and 15,4±4,7, respectively[p=0,000].In the study which was carried out by Nacar, the score about the abovementioned sub group with medicine students was found out to be 16,0 ± 4,4, while in Güner's study, the mean score was rather low with 8,0±2,26, while in Kurt's study, it was 19.9±4.21, and in Türkol's study, it was 14.7±4.24, and in Özveren's study, it was 17,4±5,16, and finally, in Şen's study, it was 15,2 ± 4.7. Gender, economic status and profession are exhibited to be the factors effecting Healthy Lifestyle in several studies (18, 19, 20, 21).

Nourishment Sub Group: It determines the changes in individual's choosing and arranging his meals and choosing his food. The participants receive between 9 and 32 points out of 9 questions. Total scores for nourishment was found to be 19, 1±4, 4 for DUMF students, while it was 18, 8±3,6 for YYUMF students(p=0,067). The scores about the same sub group is 18, 8±4, 43 for males, while it is 19,4±3,85 for females (p=0,356). On the other hand it is 19,6±3,90 for the ones whose economic condition is good, while it is 16,5±3,69 for the ones whose economic condition is bad(p=0,010). This difference is considerably significant. In the literature, there are several values for the same sub group such as in the study conducted by Kurt it is 19,0±3,68, and by Türkol, it is 19,1±3,72, and by Şen, it is 18,46±4,1. That the economic status is good positively affects the decisions about nourishment.

Spiritual Development Sub Group: This sub group determines the individual's living style, his ability to improve himself, and how much he knows himself and if he can please himself. In this section, the students can get 9 points at least and 36 points at most. Spiritual development total score was found as 26,3±4,5 with DUMF students, while it was 24,4±5,8 with YYUMF students(p=0,012). The scores for the same sub group is 25,6±4,5 for males, while it is 26,2±5,6 for females, and 26,7±5,6 for students with good economic status, while it is 25,5±5,8 for students with bad economic status, which is found trivial. In other studies, for example, Nacar found 26,5±4,5 total score mean with medicine students, and Şen found 23,4±5,2, and Güner found 21,0±3,26.

Stress Management Sub Group: It determines the level of stress sources and stress control mechanisms of individual. In this section the participants can get 8 points at least and 32 points at most. The total score mean of stress management for DUMF students was found to be 20,0±3,6, while it was 19,4±4,5 for YYUMF students(p=0,321). The score was found as 19,7±3,57 for males and 20,02±4,39 for females; and 20,1±3,08 for ones with good economic status and 20,01±3,08 for the ones with bad economic status(p=0,063). In other studies, the scores are as these: Şen: 17,4±3,5, and Güner: 16,0±3,13, and Kurt: 19,0±3,16, and Türkol:17,0±3,76.

Interpersonal Relation Sub Group: It determines the individual's contact with his close friends and the level of constancy of this communication. In this section, the participant can get 9 points at least and 36 points at most. The total score mean of interpersonal relations is 24,9±4,5 for DUMF students, while it is 23,1±3,6 for YYUMF students (p=0,002). According to study, for the same sub group, the score for male participants is 23,9±4,19, while it is 25,3±4,5 for female participants; and it is 24,8±4,09 for the ones with good economic status, while it is 24,0±5,58 for the ones with bad economic status. The mean scores received for interpersonal relations in other studies are these: In the study carried out by Nacar, it is 25,1±4,1, and In the study carried out by Şen, it is 23,4±5,2, and In the study carried out by Kurt, it is 24,4±4,20, and In the study carried out by Türkol, it is 23,7±3,73, and In the study carried out by Güner, it is 21,0±3,26.

5. Result and Suggestions

It is important that medicine faculty students carry on healthy Lifestyle owing to the fact that they make role model for the society. While it is possible to attain 204 total score from HLSBS-II, the medicine faculty intern students have obtained an average of 127,85 score, and while it is possible that they can achieve 32 score from physical activity sub group, they have received 16,42 score. This case is thought provoking. In order to adopt healthy Lifestyle behaviour as our Lifestyle, the earlier age we start and provide opportunities, the healthier the society will be.

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HOSPITALIZATION RATES OF PATIENTS USING COMMUNITY MENTAL HEALTH CENTER SERVICES

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Abstract: *Non-adherence to treatment and hospital admissions are the common problems in severe mental disorders. To determine the contribution of community mental health services to increased hospitalization rates of patients previously diagnosed with severe mental disorders such as schizophrenia spectrum and other psychotic disorders and bipolar disorders. 356 patients diagnosed with bipolar disorder, schizophrenia, schizoaffective disorder, and unspecified schizophrenia spectrum and other (USSO) psychotic disorders in accordance with the DSM–5 criteria and treated in the CMHC on the south coast of Turkey were included in this retrospective study.The hospitalization records of the patients were examined over three different periods. First and second period: two divided years which patients had not yet received CMHC services before registration. Third period: one-year, during which patients using CMHC services. A total of 356 patients were included in the study. SPSS 22.0 (IBM Corporation, Armonk, New York, United States) software was used in the analysis of variables. Normal distribution of data was assessed with the Shapiro–Wilk test. The diagnosis of the participants in the study were 157 (44%) schizophrenia, 35 (9.8%) schizoaffective disorder, 102 (28.7%) bipolar disorder and 62 (17.4%) unspecified schizophrenia spectrum and other psychotic disorders. As a result of the hospitalization rates, there was a significant difference between three periods. The median number of hospitalization days during the first episod was calculated as 1.0 (mean 13.9), the second period 0.7 (mean 18.59) and third period 0.6 (mean 5.83), respectively.The rate of hospitalization was 32.9% in the first period, 42.4% in the second period and 12.9% in the third period. This study provides the new evidence regarding the ability of primary services offered in the community mental health centers.*

Key words*: hospitalization, schizophrenia, bipolar, psychosis, community mental health center*

1. Introduction

Non-adherence to treatment and hospital admissions are the common problems in the management of schizophrenia spectrum and related disorders, and bipolar disorders [1-3]. Reducing rehospitalisations in mental health care is a major challenge in Turkey. Rehospitalization is predicted by a combination of variables including the medication characteristics/adherence and healthcare-

professional-related assessment [3,4]. Psychosocial interventions in psychiatric disorders may have long-term effects on recurrence and rehospitalisations rates [5]. In this context, educational programs are being developed for both patients, and the knowledge and attitudes of the patients about mental healthcare are reviewed [6]. An appointment reminder and coordination by a member of the health care team is likely to improve the treatment compliance with multidimensional implementation strategies such as educational materials or meetings [6]. A meta-analysis on psychoeducation has shown that if both patients and their family participate in psychoeducation, recurrence and re-admission rates decrease [7]. Additional treatment options would be useful to decrease recurrence and re-admission rates due to the fact that medical treatment alone is not sufficient. For this purpose, the World Health Organization (WHO) recommends the community-based mental health model (unlike hospital-based care) [8]. The development of Community Mental Health Centers with outpatient clinics in Turkey was one of the main strategies in a 2008 national action plan on mental health. Community mental health centers were established in Turkey to provide psychosocial support services for patients with severe mental illnesses such as bipolar disorder, schizophrenia spectrum and other psychoses [9]. The first study was conducted in Bolu CMHC (five years after the implementation of CMHC on a national plan for mental health in Turkey) on 18 patients with severe mental illness who were frequently admitted (more than three hospitalization in 18 months) to a hospital. The study showed that CMHC systems may reduce the number of acute hospitalizations [10]. However, as far as we know, there is no large-scale study in the literature about rehospitalization rates of all patients using CMHC services, regardless of participation frequency in Turkey.

We aimed to determine the contribution of community mental health services to increased hospitalization rates of patients previously diagnosed with severe mental disorders such as schizophrenia spectrum and other psychotic and bipolar disorders.

2. Material and Method

356 patients diagnosed with bipolar disorder, schizophrenia, schizoaffective disorder, and unspecified schizophrenia spectrum and other psychotic disorder (USS & OPD) according to the DSM–V criteria as assessed by psychiatrist and treated in the CMHC on the South coast of Turkey between 01 October 2016 and 31 September 2017 were included in this retrospective study. To evaluate the effectiveness of CMHC on hospitalization rates were compared taking into consideration three different periods: 1st and 2nd : Two years which patients had not yet received CMHC services and benefited from a standard care only before registration. 3rd the one-year period, during which patients using CMHC services and received a standard clinic-based care. For example; if patient registrated CMHC on 01.11.2016, first period is determined as between 01.11.2014-.01.11.2015, second period 01.11.2015-01.11.2016, third period 01.11.2016-01.11.2017. The previous two-year period, during which patients had not yet received CMHC services, is determined as the first and second periods respectively to see the natural course of disorders without additional psychosocial interventions.

In the XXXX CMHC where the study was conducted, the patients were subjected to the psychoeducation process for at least every 6 months. Moreover, psychoeducation was provided in the home environment by visiting patients at home. The frequency of participation of the patients was determined by a phychiatrist and a psychologist according to the severity of the disease and the patient's preference. The patients using CMHC every three months or more frequently participated in the collective social activities at CMHC. The patients using CMHC every month or more frequently participated in daily skill therapies at CMHC. The patients using CMHC every week participated in

group therapies at CMHC. With the appropriate schedules specific to the severity of illness, all patients were contacted at least every three months and the patients were provided with CMHC services by reminding via phone calls.

This study was conducted using routinely collected clinical data from CMHC. Information about the number of hospitalizations and a hospital name at the time of registration were obtained from patients and their family. During the one-year follow-up, new hospitalizations and hospital names were recorded. The information about hospitalization was scanned with the permission of presidency of public hospital services.

The patient exclusion criteria were as follows: being under 18 years of age, dementia, moderate or severe mental retardation, organic mental disorder and first-episode psychosis. The patients gave their consent, and the approval for the study was obtained from the Medical Ethics Committees of the institutions.

Days spent in a hospital were retrospectively screened. These assessment score were compared for three periods.

2.1.Statistical Analysis

SPSS 22.0 (IBM Corporation, Armonk, New York, United States) software was used in the analysis of variables. Normal distribution of data was assessed with the Shapiro–Wilk test. Mann-Whitney U Test was used with Monte Carlo results to compare two independent groups with each other according to quantitative data. In order to compare the categorical variables with each other, the Pearson Chi-Square, Fisher Exact and Fisher-Freeman-Holton tests were used and provided with Monte Carlo and Exact results. The Kendall's tau-b test was used to analyze the correlations between the variables. The quantitative variables were expressed as median range (maximum-minimum) and categorical variables as n (%). The variables were analyzed at a confidence interval of 95% and a p value of <0.05 was accepted as statistically significant.

3. Results

A total of 356 patients were included in the study: 157 (44%) schizophrenia, 35 (9.8%) schizoaffective disorder, 102 (28.7%) bipolar disorder and 62 (17.4%) unspecified schizophrenia spectrum and other psychotic disorder (USS & OPD) patients. The mean age of the patients was 41.1±12.5 years, the mean age of onset of illness was 23.4±9.1 years and the mean number of life-long hospitalizations was 5.6±6.9. The study group was composed of 223 (66.6%) males and 133 (37.4%) females. The sociodemographic data of the patients are shown in Table 1.

Table 1. The sociodemographic data of the patients

		n	%
Diagnoses			
	Schizophrenia	157	44,1%
	Schizoaffective	35	9,8%
	Bipolar	102	28,7%
	USS&OPD	62	17,4%
Sex			
	Male	223	62,6%
	Female	133	37,4%
Marrital Status			
	Single	239	67,1%
	Married	117	32,9%
Alcohol use			
	No	344	96,6%
	Yes	12	3,4%
Tobacco use			
	No	152	42,7%
	Yes	204	57,3%
Substance use			
	No	341	95,8%
	Yes	15	4,2%
	N	**Mean±SD.**	**Median (Min. / Max.)**
Age	356	41,12±12,51	39 (17 / 72)
Education years	356	7,42±4,09	7 (0 / 16)
Onset Age	355	23,40±9,09	20 (16 / 57)
Prior hospitalization	348	5,61±6,90	3 (0 / 37)

SD.:Standard deviation, Min.:Minimum, Max.:Maximum

The median number of days spent in a hospital during the first period was calculated as 1.0 (mean 13.9), the second period 0.7 (mean 18.59) and during the third period 0.6 (mean 5.83), respectively. There were not significant differences between the first and second period. There were significant differences between the third period and first/second period (Table 2). The total number of days spent in a hospital during the first period was calculated as 4730, the second period 6258 and during the third period 2047 days, respectively.

Since the data did not comply with the normal distribution, hospitalizations were also evaluated as hospitalization rates of each period. The hospitalization rate during the first period was 32.9%, during the second period was 42.4% and during the third period was 12.9%. There were significant differences between three periods (Table 2).

Table 2. The number of days spent in hospital and hospitalization rates

TOTAL	First period	Second Period	Third Period	P	Binary Comparisons		
					P(1-2)	P(1-3)	P(2-3)
	Median (Min./Max.)	Median (Min./Max.)	Median (Min./Max.)				
Number of days spent in hospital	1,0 (0 / 186)	0,7 (0 / 265)	0,6 (0 / 196)	**<0,001**	0,242	**<0,001**	**<0,001**
	n (%)	**n (%)**	**n (%)**				
Hospitalization							
No	239 (67,1)	205 (57,6)	310 (87,1)	**<0,001**	**0,002**	**<0,001**	**<0,001**
Yes	117 (32,9)	151 (42,4)	46 (12,9)				

Cochran's Q test(Monte Carlo), Friedman Test(Monte Carlo); Post Hoc Test : Dunn's Test, Min.:Minumum - Max.:Maximum

There were statistically significant difference between bipolar disorder and USS & OPD patients when comparing the first and second periods. There was statistically significant difference between schizophrenia and USS & OPD patients when comparing the first and second periods (Table 3).
There was no statistically significant difference between all diagnostic groups when comparing the second and third periods, and the first and third periods with all assessment scores (Table 3).

Table 3. Comparison between diagnostic groups in terms of hospitalized days

		Difference	Hospitalization days
			Median (Min./Max.)
Schizophrenia	→ A		
		(2-1)	0,0 (-74 / 211)
		(3-1)	-1,3 (-92 / 89)
		(3-2)	-0,5 (-207 / 89)
Schizoaffective	→ B		
		(2-1)	0,7 (-51 / 79)
		(3-1)	-0,4 (-102 / 22)
		(3-2)	-4,8 (-73 / 0)
Bipolar	→ C		
		(2-1)	0,4 (-72 / 94)
		(3-1)	-1,0 (-91 / 57)
		(3-2)	-2,8 (-120 / 72)
USS&OPD	→ D		
		(2-1)	2,3 (-65 / 86)
		(3-1)	-1,3 (-185 / 61)
		(3-2)	-2,5 (-203 / 6)
Comparison between groups-Difference			**0,021**

(2-1)		
	A→B	0,103
	A→C	0,529
	A→D	**0,004**
	B→C	0,251
	B→D	0,559
	C→D	**0,031**
Comparison between groups-Difference (3-1)		0,538
Comparison between groups-Difference (3-2)		0,403

Kruskal Wallis Test(Monte Carlo); Post Hoc Test : Dunn's Test, Min.:Minumum - Max.:Maximum

There were not significant differences between the first and second period in terms of hospitalization days in schizophrenia patients but there were significant differences between third period and first/second period (Table 4).

Table 4. The number of days spent in hospital for each diagnostic groups

Diagnosis	Peryot	Hospitalization days	Hospitalization-No	Hospitalization-Yes
		Median (Min./Max.)	n (%)	n (%)
Schizophrenia	→ A			
	1	1,9 (0 / 146)	107 (68,2)	50 (31,8)
	2	0,6 (0 / 211)	94 (59,9)	63 (40,1)
	3	0,6 (0 / 119)	137 (87,3)	20 (12,7)
Schizoaffective	→ B			
	1	0,8 (0 / 186)	25 (71,4)	10 (28,6)
	2	4,8 (0 / 265)	20 (57,1)	15 (42,9)
	3	2,0 (0 / 196)	29 (82,9)	6 (17,1)
Bipolar	→ C			
	1	1,3 (0 / 115)	62 (60,8)	40 (39,2)
	2	4,1 (0 / 153)	60 (58,8)	42 (41,2)
	3	1,1 (0 / 94)	88 (86,3)	14 (13,7)
USS%OPD	→ D			
	1	1,8 (0 / 185)	45 (72,6)	17 (27,4)
	2	4,4 (0 / 203)	31 (50,0)	31 (50,0)
	3	0,6 (0 / 117)	56 (90,3)	6 (9,7)
Schizophrenia Group P Value		**<0,001**		**<0,001**
	1→2	1		0,105
	1→3	**0,002**		**<0,001**
	2→3	**0,001**		**<0,001**

Schizoaffective Group P Value	**<0,001**	**0,006**
1→2	0,454	0,231
1→3	0,846	0,472
2→3	**0,036**	**0,004**
Bipolar Group P Value	**<0,001**	**<0,001**
1→2	1	1
1→3	**0,006**	**<0,001**
2→3	**0,002**	**<0,001**
USSO psychotic Group P Value	**<0,001**	**<0,001**
1→2	0,059	**0,004**
1→3	0,492	**0,037**
2→3	**0,001**	**<0,001**
Comparison between groups -1	0,644	**0,396**
Comparison between groups -2	0,589	**0,603**
Comparison between groups -3	0,753	**0,731**

Cochran's Q test(Monte Carlo), Friedman Test(Monte Carlo) - Kruskal Wallis Test(Monte Carlo); Post Hoc Test : Dunn's Test, Min.:Minumum - Max.:Maximum

There were not significant differences between the first and second/third period in terms of hospitalization days in patients with schizoaffective disorder; however, there were significant differences between the second and third periods (Table 4).

There were not significant differences between the first and second periods in terms hospitalization days in bipolar patients; however, there were significant differences between the third period and first/second period (Table 4).

There were not significant differences between the first and third periods in terms of hospitalization rates in USS & OPD patients. There were significant differences between the third and second period. There were significant differences between the first and second periods in terms of total number of days spent in a hospital (Table 4).

4. Discussion

This study investigated the association between CMHC services and hospitalization days in patients with schizophrenia spectrum and other psychosis and bipolar disorder patients. The participation in the CMHC was observed to be a positive contribution to illness management taking into consideration rehospitalization rates.

Firstly, we found that the rate of hospitalizations significantly increased during the second period when patients had not yet received the CMHC services during the natural course of the disease. In the natural course of the diseases, the diagnosis of bipolar disorder was found to be in lower relative risk as 0.12 than schizophrenia and other psychosis in terms of rehospitalizations [11]. In our study we found significant differences between the first and second periods in only USS & OPD patients when we assessed each category of diagnosis.

It was noteworthy that the number of days spent in hospital decreased after patients participated in the CMHC. The early intervention services were found to be associated with better outcomes than treatment as usual [11]. We found that community mental health centers achieve decrease in rehospitalization in adults with chronic mental disorders. This study shows that psychosocial interventions are still effective even in later stages of mental disorders.

In other studies, physicians stressed treatment adherence effects on rehospitalization rates [1, 2, 4]. Non-adherence to treatment increases the hospital admission [1,12]. However, rehospitalization is predicted not only by treatment adherence but also by a combination of variables such as medication characteristics and healthcare-professional-rated assessment[3]. In our study, it was noteworthy that using CMHC services on a regular basis and multidimensional implementation strategies such as educational materials, treatment monitoring, family education, group therapies, organization of both in-and outpatient mental health services, easy access to the medical team even via phone or by outpatient visits, significantly decreases rehospitalization rates. All of these strategies should provide a positive contribution to the illness management and decrease in rehospitalization rates [13-18]. Such strategies must be implemented in typical real-world settings.

A limitation of our study was the lack of a prospective study and a control group consisting of patients benefited only from outpatient clinic services. Significant heterogenity in diagnosis of disorders and only one-year follow-up is another limitation of this study.

5. Conclusion

This study provides the new evidence regarding the ability of primary services offered in community mental health centers to achieve decrease in rehospitalization in adults with chronic mental health issues.

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ASSESSING INSTITUTIONAL CAPACITY OF COUNTY HEALTH DEPARTMENTS IN KENYA USING THE HEALTH SYSTEMS FRAMEWORK: IMPLICATIONS FOR SERVICE DELIVERY AND OUTCOMES

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Abstract: *The study used the county institutional capacity assessment tool (CICAT) to assess the capacities of selected county health departments (CHDs) along the World Health Organization (WHO) health systems framework that is organized around the six building blocks. The aim was to determine the current status of the six health system building blocks in Kenya's county health departments. The article emanates from data collected for a technical report on county institutional capacity assessment. Data were analysed using Microsoft Excel spreadsheet and thematic analysis. The overall performance of the counties was 54% indicating average capacity. The performance scores were: leadership and governance (39%), human resources for health (44%), health information systems (66%), medical products and technologies (50%), health system financing (50%), and service delivery (71%). There was no statistically significant difference in the overall performance of the counties (p= 0.892). The key issues in some of the worst performing building blocks included poor work-planning and lack of transparency in budgeting and expenditure, low funding and irregular disbursements of health budgets, lack of key policies, e.g. workforce strategy and commodity supply chain. In conclusion, the study proved that the CICAT is useful for assessing the process of strengthening health systems in Kenyan counties.*

Key Words*: Capacity development, health department, county, Kenya*

1. Introduction

Capacity development is essential for institutional ownership of policies and plans; for institutional efficiency; for community empowerment; and for maintaining nationwide progress over time [1]. Capacity is defined by the Organization for Economic Co-operation and Development's- Development Assistance Committee (OECD-DAC) as the "the ability of people, organizations, and society as a whole to manage their affairs successfully; and capacity development as the process by which people, organizations and society as a whole create, strengthen and maintain their capacity over time"[2]. As opposed to the traditional view of capacity development as all about human resource development, the broader scope includes whole system and institutional transformation and local ownership, policy impact, and sustainability[1].

Capacity development in the health sector is crucial to the realization of national health agenda and the Sustainable Development Goals (SDGs), particularly SDG 3 - *Ensure healthy lives and promote well-being*

for all at all ages. To achieve health sector goals, Kenya devolved its governance system in 2013 and created devolved units of governance called counties. County governments are largely responsible for service delivery through respective county health departments (CHD). To strengthen service delivery at county level, the national government has partnered with development agencies to assess and develop capacities of CHDs across the country. To this end the United States Agency for International Development (USAID) developed a county institutional capacity assessment tool (CICAT) to guide assessment of capacities and formulation of capacity development strategies for CHDs. The WHO health systems framework consisting of six building blocks was used to guide the capacity assessment of the CHDs.

The WHO [3] explains the six building blocks as follows: Leadership and governance involve ensuring the existence of policy frameworks combined with effective oversight, coalition building, regulation, attention to system design and accountability. A well-performing health workforce is responsive to patient needs, fair and efficient to achieve the best health outcomes possible under prevailing financial and social conditions. A well-functioning health information system ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status. A well-functioning health system ensures equitable access to essential medical products, vaccines and technologies of assured quality, safety, efficacy and cost-effectiveness, with efficiency in use. A good health financing system raises adequate funds for health, in ways that ensure people can use needed services when they need them and are protected from financial catastrophe or impoverishment. Service delivery is an immediate output of the inputs into the health system, such as the health workforce, procurement and supplies, and financing. Services delivered are expected to be of sufficient quality to be effective, are available to those who need them when they need them [4, 5].

Effective and sustainable capacity development requires institutionalized capacity needs assessment to progressively identify and address capacity gaps. For example, CHDs will need to improve in all the six health system building blocks and coordinating them in ways that ensure equitable and sustainable health benefits and outcomes across diverse population groups. This requires technical and political knowledge and action [6]. The assessment is particularly critical for the counties which are responsible for service delivery and the country as a whole as it makes reforms for universal health coverage (UHC).

The goal of the assessment was to develop a shared understanding of the current capacity of the institutions and organizations that the management of the CHDs represent in order to analyse gaps and develop a responsive capacity building strategy in the form of action plans. USAID Health, Population and Nutrition (HPN) planned to use assessment results to develop leadership, knowledge and skills of county health department officials; and strengthen their planning, performance, oversight and public financial management and revenue generation systems.

2. Methods

The manuscript comes from analysis of data from an institutional capacity assessment exercise conducted by USAID and International Business and Technical Consultants Inc. (IBTCI). The study was a cross-sectional survey. The data were collected using a questionnaire tool that was adapted from and harmonized with a number of Organizational Capacity Assessment Tools (OCAT). Data were collected from February to June 2018 in five purposively selected administrative zones (counties): Busia, Kakamega and Migori counties to the west of Kenya, Mombasa County at the coastal region, and Turkana County to

the north. The five are part of USAID priority counties in Kenya and were selected based on USAID's current health portfolio investments [HIV/AIDS, reproductive, maternal, neonatal, child & adolescent health (RMNCAH), nutrition and malaria], and presence of other development partners for effective leveraging of resources for greater impact.

Questionnaire administration was collaborative; i.e. it was first and foremost a self-assessment tool, meaning that study participants including members of the county and sub-county health management teams (CHMT) and (SCHMT), and implementing partners worked through each component of the tool together. The total number of participants per county in the assessment ranged from 20 – 24. The results of the assessment for each county were later validated in a workshop held in each county. The total number participating in the validation workshops ranged from 34 – 38 including the original participants in the initial assessment exercise.

The questionnaire included a summary score sheet organized by building block. Scores were weighted from 0 to 4, being the lowest and highest scores, respectively. Zero meant no indication of capacity; a score of 1 meant only the very basic indicators of capacity existed; 2 meant that indicators in 1 in addition to another or others; 3 meant existence of all indicators in 2 in addition to another/others, and 4 meant high capacity involving all the indicators in 3 plus other attribute(s). A 4-point Likert scale (Table 1) was used to rank indicators of capacity for each building block using defined attributes/standards (see tool summary in Annex 1), while a 5-point Likert scale (Table 1), expressed in percentages, was used to provide overall capacity indicator by county.

Table 1. Indicator standards score: 4-point Likert Scale and Score Matrix for the CICAT

0-1	No Capacity
2	Low Capacity
3	Moderate Capacity
4	High Functional Capacity
Overall indicator Score: 5-point Likert Scale	
20% & below	No Capacity
21% – 39%	Limited Capacity
40% - 59%	Average Capacity
60% - 79%	Significant Functional Capacity
80% & above	Very Significant Functional Capacity

NB/ All scores were out pf 16 (100%) except service delivery which was scored out of 20 (100%)

The WHO's six building blocks served as the analytical domains. Basic descriptive statistics were used in the analysis. A trend analysis was used to determine the overall change in key health financing indicators over the last 4 years since the start of devolution, plotting year by year to assess the level of the quantitative indicators using basic statistical analysis methods. For the qualitative component of the evaluation study, content analysis was used to identify key themes and categories to support quantitative evidence generated from the questionnaire.

3. Ethical approval

Secondary data sources were used in the manuscript development so no ethical approval was required.

4. Results

4.1 Overall performance by county

Figure 1 illustrates total capacity of counties before and after validation of the results of the assessment. The scores after validation were taken as the final scores of the evaluation study.

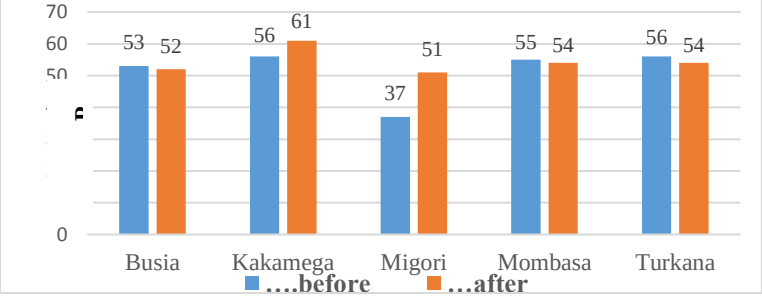

Figure 1. Capacity scores before and after validation of findings

There were no major differences in the scores before and after validation of findings except in Migori County, which was explained on inability to locate key documents before validation of the findings. One-way ANOVA returned no statistical difference in the overall performance of the five counties (P= 0.892).

4.2 County capacity scores by building block

This section shows total average scores per county by building block. The total average score in all the six building blocks was 54.3% indicating average capacity for all the counties combined but with individual county variations. On individual building blocks (Figure 2), the total average capacity in leadership and governance block (39%) is the lowest with Mombasa County showing the greatest weakness in this block. As a key building block, it suggests a fundamental weakness in the health system even as Kenya makes reforms toward UHC. Health information systems (HIS) block is the best performing with all the counties demonstrating (66% on average).

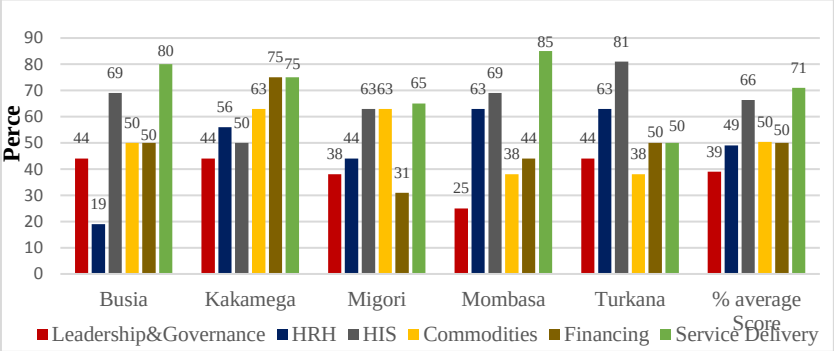

Figure 2. Total capacity of counties in each Building Block

[**KEY**: 20% & below= No capacity; 21% – 39%= Limited capacity; 40% - 59%= Average capacity; 60% - 79%= Significant functional capacity; 80% & above= Very significant functional capacity]

There is average capacity (50%) in the health commodities and technologies block. Qualitative data indicated persistent transport problems as the main issue affecting distribution of commodities in health facilities in low performing counties such as Turkana and a lack of supply chain data tracker in Mombasa CHD. In the Financing block, Migori County due to low transparency in budget allocation and rigid control of health funds by the county treasury.

A trend analysis of health financing for all the counties (Figure 3) indicated limited yet unpredictable financing for most of the counties, which hinders planning and delivery in priority services. The trends suggest relatively high budget allocations by county governments to the county health departments, e.g. 30.1% of total county budget in Kakamega County. However, in terms of per capita spending, the figures are very low ranging from USD 15.2 (Migori) to USD 21.3 (Mombasa). Even with input from the national government, such levels of expenditure do not meet the USD 90 recommended by the WHO as the minimum per capita health spending required to guarantee a minimum package of health services.

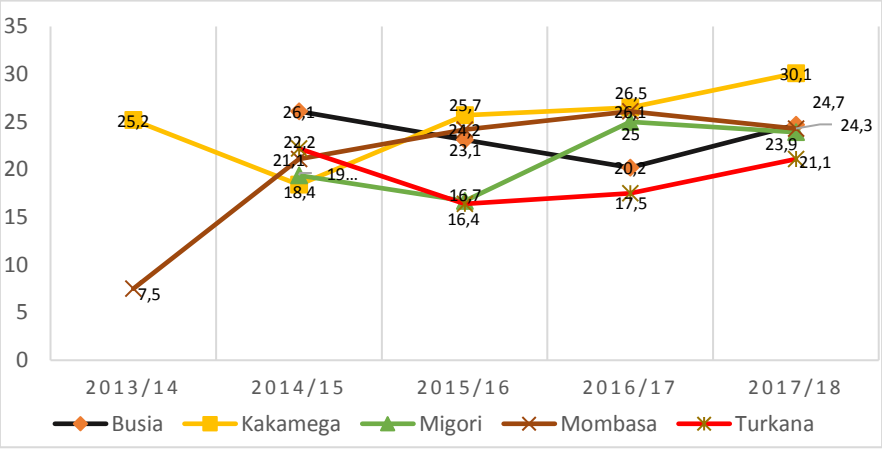

Figure 3. Health budget allocations as a percentage of total county budget

The Service Delivery block is quite strong at 71% on average (significant functional capacity). The high scores could be attributed partly to the technical and financial engagement by donor agencies which largely support services related to HIV/AIDS, malaria, TB, and reproductive, maternal, neonatal, and child health (MNCH) services.

4.3 Factors driving county performance in each building block

The results from the indicator scores are summarized in Figure 4.

[**Key:** 0 – 1= no capacity; 2= low capacity; 3= moderate capacity; 4= high functional capacity]

From the indicator scores, in the Leadership and Governance (L&G) block, all the counties except Turkana have significant capacity to develop and implement a county health strategy. Lack of funds and technical capacity were the main reasons cited for the lack of capacity to develop and implement a county health department strategic plan in Turkana County. The main weakness for all the five counties was in their "capacity to communicate effectively within the county and sub-county health department and other departments within the county". From the qualitative data, this was explained on absence of a communication strategy and key protocols guiding information flow within the CHD and between the CHD and implementation partners. Turkana and Migori counties demonstrate significant capacity to "lead and engage with different health actors working towards a common goal", a factor which was explained on a clearly defined memoranda of understanding (MOUs) with implementing partners. Overall, Mombasa CHD demonstrated 'no capacity' in most indicators which was partly linked to a lack of clear policy guidelines on health sector priorities as well as irregular update meetings to discuss emerging leadership challenges at county, sub-county and community levels.

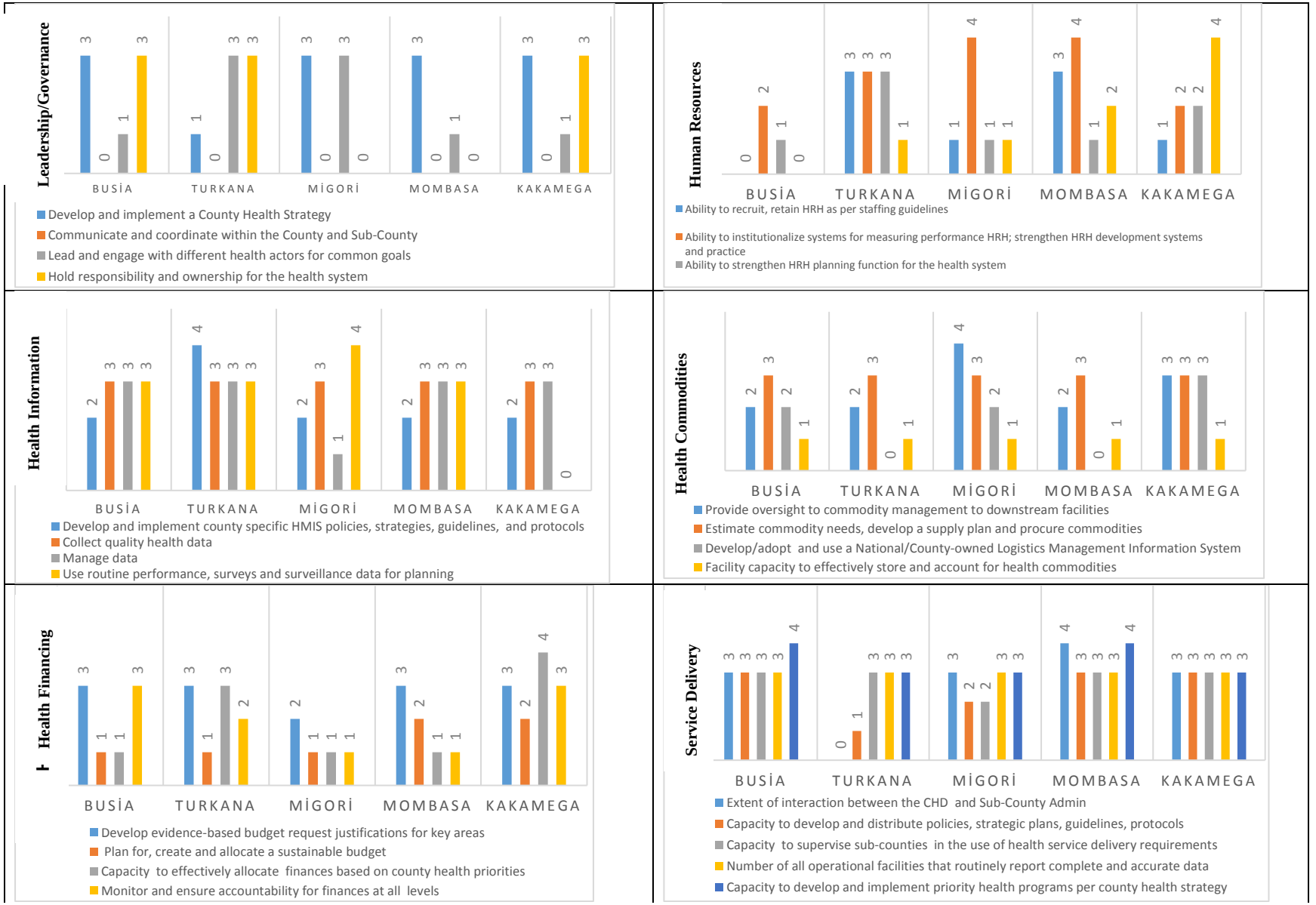

Figure 4. Indicator scores for each Building Block by county

On the whole, the most outstanding issues contributing to the general weakness in L&G block for all the counties included lack of a monitoring and evaluation framework to track the progress of county health sector strategic and investment plan (CHSSIP) as well as inadequate capacity to develop work plans which affects definition of health department goals and objectives. Besides, the governance structure fails to properly define the roles and responsibilities of key actors in achieving county health strategy goals. The actors are poorly coordinated which affects their involvement in annual sector reviews, work plan development and policy formulation.

In the human resources (HRH) block, the significant capacity showed particularly by Turkana County, a remote and hardship area, was linked to the political leadership in the county that is keen to attract and retain health workers. The county health department has since rolled out a number of incentives including housing, hardship allowances, transport and annual leave allowances as well as training opportunities, to attract and retain health workers. Busia and Migori CHDs have no capacity in all but one component of HRH. The main challenges in both counties include a lack of strategy to attract, recruit and retain HRH, lack of incentives as well as poor working conditions including lack of opportunities for feedback, unavailability of commodities at health facilities, poor dissemination of HR policies and lack staff needs assessment.

The health information systems (HIS) block is performing well; however, there are still capacity gaps affecting all the counties. These included inadequate regular data analysis and sharing with key actors such as CHMTs, SCHMTs and non-state actors for use as evidence in strategic planning and policy making including rational budgeting and decision-making; inadequate supply of data collection tools especially at facility and community levels, which affects timely forecasting for commodities and overall quality of services. Other capacity gaps include inadequate staff capacity on data management (knowledge and skills) as well as poor dissemination of M&E framework, plans, protocols and guidelines to the sub counties.

In the health commodities and technologies block, there are serious weaknesses in specifically two areas: capacity to develop and/or adopt and use a national/county-owned logistics management information system (LMIS), and capacity for facilities to effectively store and account for health commodities. The main focus for all the counties in this building block should be to build capacity to effectively store and account for all health commodities alongside a fully functional LMIS. The key issues reported in all the counties included lack of data quality improvement plan for all LMIS elements as well as lack of adequate storage for health commodities including special storage needs at all levels (county, sub-county and health facility).

Health system financing block is quite weak especially in Migori County where there is no capacity in all nearly all the indicators. Qualitative data suggested that Migori CHD specifically lack transparency in budgetary allocations as well as unclear policies in identifying and guiding the implementation of county health system priorities. From qualitative data, the main difference between Kakamega CHD, which performs best in this block, and the others, is the political will that has prioritized the health sector and has fostered transparent and accountable budget systems that target evidence-based county health priorities. In as much as not all budgetary wishes are granted, the health sector as a whole faces serious under-funding, which is complicated by a lack of department expenditure tracking and quarterly review framework. This often makes the county health department funds exposed to misuse through corruption and other forms of fraud. Other key weaknesses as informed by the qualitative data included inadequate use of evidence-based data to inform budget allocation, delays in disbursement of funds from the

national and county treasuries, and lack of skills in programme-based budgeting (PBB) especially at sub-county level which affects proper linkages between the budgets and work plans. The main issue with PBB implementation is lack of capacity to develop clear and implementable programme and sub-programme objectives and performance indicators. Although most counties have been trained on PBB, there were no follow ups to entrench PBB skills at county and sub-county levels.

In the Service Delivery block, all the counties are performing relatively well except Turkana County. The main reason for the lack of capacity in Turkana County was explained on insecurity and poor road network. This has hampered delivery of commodities to health facilities as well as discouraged potential development partners from working in the county. For all the counties, there is limited interaction between the county health department headquarters, the sub-counties and community units. This has affected effective planning and budgeting that takes into account input from different stakeholders. Other key weaknesses included irregular monitoring of compliance in the use of standards and guidelines at sub-county and health facility levels, and poor data management.

The service delivery portfolio was further disaggregated into specific services that are identified as key priority programmes for the counties: HIV/AIDS, malaria, TB/Leprosy, RMNCH, Nutrition, Water & Sanitation, and NCDs (Figure 5).

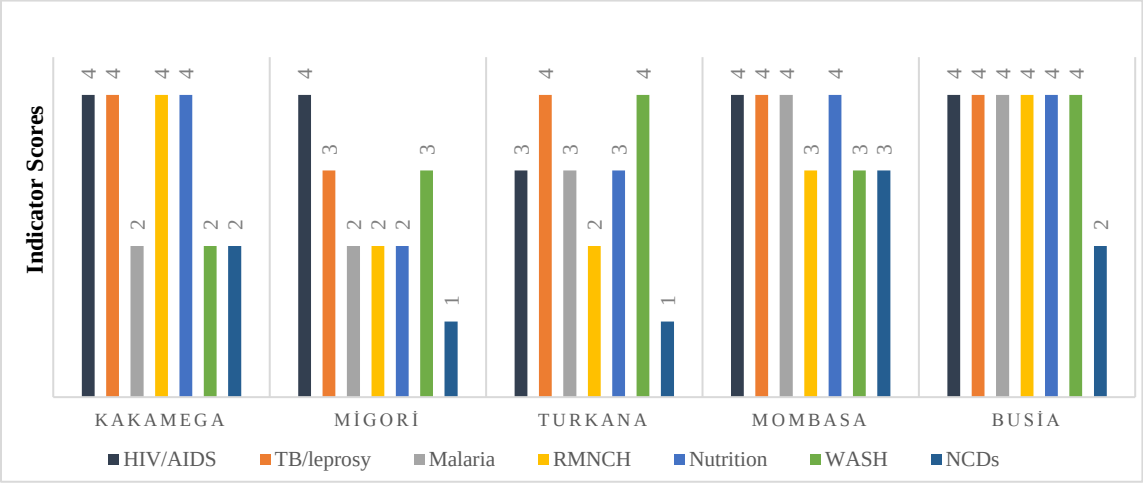

Figure 5: Capacity in specific priority service delivery areas

All the counties have very significant capacity in HIV/AIDS response largely due to the efforts of donor agencies but very low scores in NCD response. As an emerging health threat, NCDs have not received funding as a priority area over the years.

5. Implications on health outcomes

The health outcomes for the five counties are summarized in Table 2.

Table 2: Key population health indicators by county **(**Sources: [7-10]**)**

	%Immunization coverage	% Facility delivery	MMR/ 100,000	U5-MR/ 1000	NMR/1000	(%)HIV/AIDS prevalence
Kakamega	81	69	316	64	19	4.0
Migori	36	55	673	82	19	14.7
Turkana	56	30.5	1594	74	---	7.6
Mombasa	64	82	223	32	---	7.4

Busia	80	58	307	11	24	6.7
National average	67	61	362	52	22.6	6.0

The results in Table 2 indicate that the worst performing county in service delivery (Migori) also has the worst health outcomes, which suggests a direct correlation between the progress in the building blocks and health outcomes. Although Busia County is not the best performing overall, it out-performs the rest of the counties in service delivery leading to better health outcomes including full immunization (80%, utilization of ITNs (80%), facility delivery (58%), etc.

6. Discussion and conclusion

The study focused on USAID priority counties and the results may not fully reflect other counties, which have not experienced the same level of investment. Nevertheless, there are critical lessons learnt on the need to improve the performance of CHDs for effective service delivery. The study aimed at assessing the current status of CHDs along the six building blocks. In general, all the counties have average capacity and in terms of progress toward UHC, will have to make significant investment in all the building blocks to be successful. There are individual county variations in capacity and the key issues driving these variations include the political will that prioritizes health care, transparency in budget allocations to the health department, dissemination of key policy documents and protocols, and a communication strategy to help in coordinating both inter- and extra-county affairs. Getting these key areas right will contribute to strengthening all the building blocks.

Recently, an increasing number of international and local organizations have taken keen interest in health systems strengthening (HSS) as a basis for improved health for all [11-13]. The Kenya Government has also moved to strengthen the health system through such measures as devolving delivery of health services to the local units (counties) to ensure responsiveness to local needs; i.e. county governments are now entirely responsible for health system management and service delivery. This analysis helps devolved health systems to understand their key strengths and weaknesses to allow for targeted interventions and sustainable progress in HSS and UHC.

The findings indicate that lack of key health systems governance structures such as lack of a monitoring and evaluation framework and a communication strategy, contributes to significant weaknesses in the leadership and governance block; e.g. it makes it impossible to track progress of county health sector strategic and investment plans (CHSSIP). Furthermore, the incapacity to develop and/or implement annual work-plans at all levels of county departments of health affects implementation of quality health programmes. Work plans are constructed within the guidance and focus of a strategic plan [14] so it is difficult for CHD leadership to achieve their objectives from work plans drawn from strategic plans that are not informed by evidence from appropriate M&E. Work plans are management tools as such poor work-planning leads to poor management of the health sector [14]. As the results show, there is generally a weak link between county integrated development plans (CIDP), the work plans and budgets. Work plans do not seem to be guided by CIDPs and the budgets are not executed according to work plans for a number of reasons including poor quality work plans, political interference and inadequate financing for the plans. There is a need for capacity building on annual work-planning and how this is linked with the county strategic plans, as well as strengthening M&E capabilities of the counties.

In HRH, the key issues are a lack of a structure and strategy for staff attraction, recruitment and retention and a lack of timely performance feedback. These have led to poor job satisfaction and demotivation, and high rates of attrition. Recent studies in Kenya [15] and elsewhere [16, 17] point at

increased staff demotivation where strategies to attract, recruit and retain staff are lacking. The counties are currently in need of staff attraction, recruitment and retention strategies as well as capacity building on Integrated Human Resource Information System (IHRIS). The Ministry of Health (Kenya) in the current HRH strategy [18] recognizes the challenges in the HRH strategy and is working to lessen their effect on service delivery.

A common problem across most of sub-Saharan Africa and indeed many developing countries is lack of essential supplies to health facilities including drugs, basic equipment and medical supplies [19-21]. As demonstrated in this study, lack of essential commodities demotivates staff and highlights not only the incapacity of counties to analyse supply chain data for forecasting and quantification but also a general weakness in the supply chain. It is critical for the devolved units to strengthen their commodity supply systems to ensure constant supplies of essential commodities to improve service delivery.

All the five CHDs demonstrated significant functional capacity in HIS largely because of heavy donor investment in this block. However, there are still some critical gaps that need to be addressed; e.g. although the CHDs have developed many guidelines and other standard operating procedures, these have not been disseminated to the sub-counties and health facilities for quick references. Similar findings have been reported with the observation that such constraints need to be supported by realistic health information strategies and a monitoring system [6]. In addition, improvements in internet access would ease communication and allow staff to update their knowledge and translating to their patients [6].

In the healthcare financing block, the key issues were low funding and weak financial accountability mechanisms. Where funding was available, the allocations were characterized by inefficiency and lack of linkages with evidence-based plans and interventions. Recent reforms such as implementation of PBB to improve efficiency and accountability at the CHDs are important but unfortunately have been unable to effectively reduce wastages and enhance cost-effective interventions. This has been partly blamed on weak PBB skills especially at the sub-county level as well as political interference in health budget allocations. Nevertheless, the health sector generally is underfunded from public domestic sources which stand at 37% of the total health expenditure [22] against the 60% benchmark necessary for progress toward UHC[23]. Recent plans to expand enrolment into the National Hospital Insurance Fund (NHIF) as the main avenue to finance UHC is commendable and likely to resolve some of the financing challenges. It is expected that as more households contribute to the NHIF and other health insurance schemes, the national and county governments would be relieved of some financing pressure and reinvest their budgets into health system strengthening. However, efficiency is critical and widely acknowledged that improved efficiency is integral to the aspirations of health systems [24-26] .

Service delivery block is highly linked with the performance of the other blocks. Since the other key blocks- leadership and governance, health financing and HRH, are underperforming, it was expected that service delivery would be grossly affected. However, the high scores in service delivery could be explained on the fact that the data heavily relied on the assessment of key services, namely: HIV/AIDS, malaria, TB, maternal, neonatal and child health services (MNCH) and sanitation services. These services are highly donor-driven and their delivery is not entirely dependent on what happens at the CHDs. Further improvements in service delivery are however, necessary in terms of improved capacity to develop and distribute policies, strategic plans, guidelines and protocols on service delivery.

On the whole, the evaluation identified critical capacity gaps in the CHDs. Whereas there is need for improvement in all the six building blocks, more attention should be paid to the worst performers: leadership and governance, HRH and financing.

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HISTOPATHOLOGICAL CHANGES OF THE UMBILICAL CORD IN COMPLİCATED PREGNANCIES

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Abstract: *Preeclampsia, HELLP syndrome and gestational diabetes are quite common complication in pregnancy. In this study, it is aimed to compare the thickness of basal lamina and vascular structure of umbilical cord. By comparing preeclampsia, HELLP syndrome, gestational diabetes and normal pregnant women. In the study, samples were taken from postpartium umbilical cords of normal pregnant women, preeclampsia, gestational diabetes and pregnant women diagnosed with HELLP syndrome. Umblical cord samples taken during maternity, followed by routine paraffin through fixing 10% neutral formalin. In this performed as totally sixty facts through taking fifteen umbilical cords from each of four groups, Hematoxyline-eosin, Masson trichrom, periodic acid Schiff, and toluidine blue stain were applied on to the serial histological sections obtained from paraffin blocks. The obtained slides were evaluated with Zeiss Imager A 2 Microscope by taking micrographs. Morphometric measurements were statistically analyzed with SPSS software. In cases of gestational diabetes due to increased collagen production, thickening and excessive narrowing of the lumen and differentiation of Wharton jelly were observe in the umbilical artery. Differentiations are observed in the vacuolization of smooth muscle cells and muscle fibers that make up the media while camber and damage are observed in endothelial. The most significant structural changes of preeclamptic placentas are obtained as the thickening and the endothelial injury. In the umbilical cord artery medial layer, due to the growth of collagen fiber. In HELLP cases due to the increase in media diffuse edema between muscle fibers and in collagen, the thickening of umbilical artery wall and the narrowing of luminal are seen as extremely significant. Another striking symptom with HELLP cases is the observing of intramuscular hemorrhages in the umbilical artery wall as an unattained case in preeclampsia and gestational diabetes. In most of the cases, differentiation in Wharton jelly, metaplastic changes in the amniotic epithelium and thickening of the basal lamina are observed.*

Key words: *Umbilical cord, Preeclampsia, Gestational diabetes, HELLP syndrome*

1. Introduction

The umbilical cord plays an important role in interactions between mother and fetus during pregnancy. The folded umbilical cord that connects the fetus to the placenta holds the placenta in centric or eccentric positions, its length being approximately 55 cm in length.

The two umbilical arteries and a vein are located within the Wharton jelly [1].

Gestational diabetes, HELLP syndrome and preeclampsia are very common complications during pregnancy.

Gestastional Diabetes (GD) is defined as the deterioration of glucose tolerance that occurs or is detected in pregnancy. It is mostly the most common metabolic disorder [2]

Preclampsia, vasospasm and secondary organ perfusion decrease in pregnancy is a disease belonging to [3].

HELLP syndrome is generally considered a severe form of preeclampsia. HELLP syndrome is associated with high maternal and perinatal morbidity and mortality, characterized by hemolysis, elevated liver enzymes and decreased platelet count [4-5].

The aim of this study was to examine and compare the morphological changes in the umbilical cord, such as vascular structures and basal lamina thickness in patients with gestational diabetes, preeclampsia and syndrome.

2. Material and Methods

2.1. Tissue follow up for histopathological examination

The study was started after the approval of Dicle University Medical Faculty Non- interventional Clinical Research Ethics Committee. This study was performed on the umbilical cord obtained from 15 normotensive, 15 preclampsia, 15 gestational diabetes (GD) and 15 HELLP syndrome cases. Tissue of the umbilical cord 1 cm in size were taken by the placenta. Tissue samples were fixed in 10% buffered neutral formalin. Routine histological tissue was followed by paraffin embedded.

5 micrometer thick sections were taken from each paraffin block with the help of the fully automatic rotary microtome (Leica RM 2265, Germany). Hematoxylin-Eosin (H&E), Masson trichrome and Periodic Acide Schiff (PAS) were applied to the paraffin sections. The preparations were then evaluated by Zeiss Imager A2 light microscope and photomicrographs were taken.

2.2. Morphometric Measurements

The cross-sectional area, umblical artery lumen, vein lumen and tunica media thickness were measured by Zeiss axio imager 2 microscope using the Zen 2012 Sp2 (blue edition) program.

Furthermore, macroscopically, each sample was measured with umbilical cord total circumference length and total diameter planimeter.

In each section, the mean of the maximum and minimum diameter values for the measurement of the artery and vein lumen were taken into account. In the measurement of thickness of the tunica medial layer, 1 artery and 1 vein were selected separately for each sample. Five different regions were measured in the media layer and the mean values obtained were measured as the mean thickness of

tunica media layer. For all samples, total umbilical cord total circumference length, umbilical cord total diameter as well as both artery and vein tunica media layer thickness and lumen diameter averages were obtained.

2.3. Statistical Analysis

One-way analysis of variance (ANOVA) test was used to compare the averages of the umbilical cord total measurements, arterial and vein parameters, and in the case of statistical significance, multiple comparisons Dunnett and Tukey HSD multiple comparison tests were used. A 95% confidence interval was applied in all tests and $p < 0.05$ was considered statistically significant.

3. Results

3.1. Umbilical cord histopathological results

3.1.1. Histopathological results of the control group umbilical cord

Normal histological structure was observed in the umbilical cord sections of the control group. The outermost single-row cubic amniotic epithelium and the Wharton jelly under it observed 2 arteries and 1 vein (Figure 1).

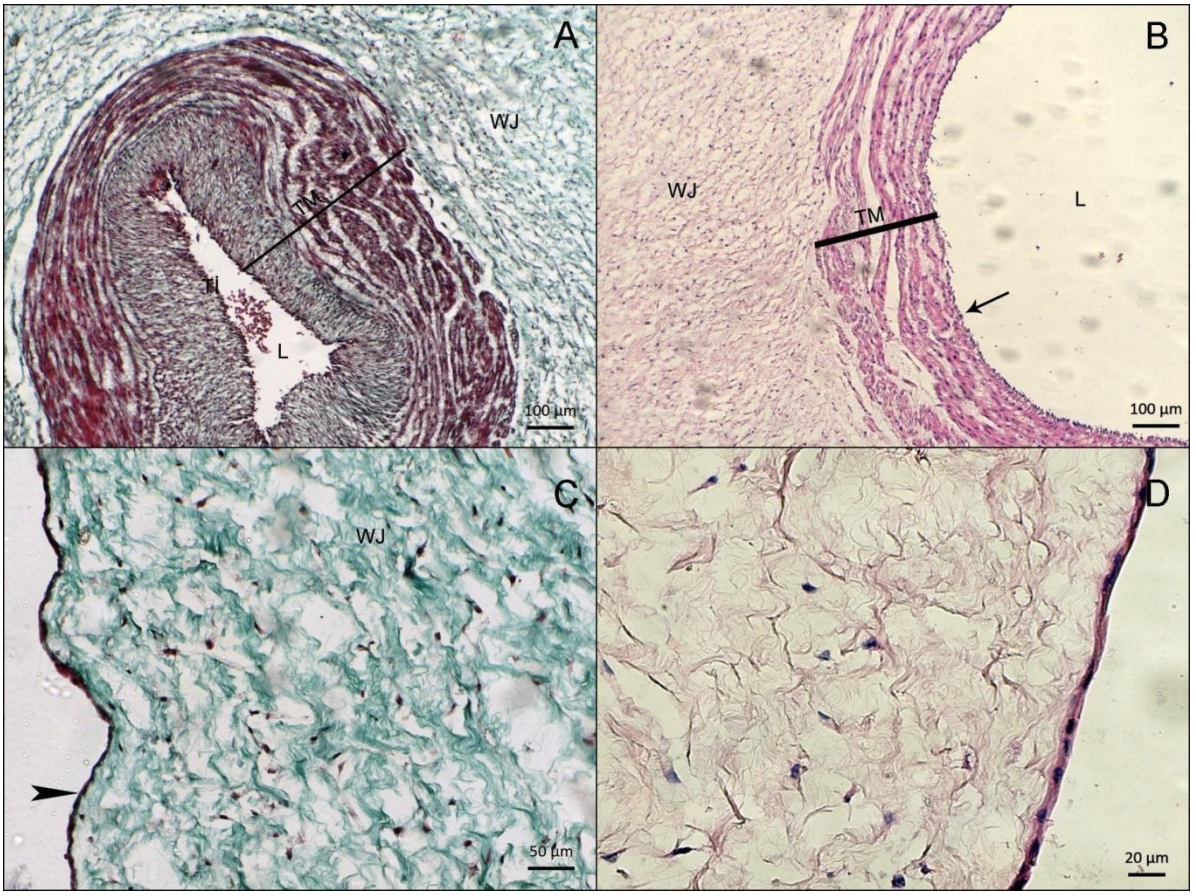

Figure 1. Normotensive section of the umbilical cord sections. a) View of the umbilical artery (Masson trichrome, Bar: 100 µm). b) Umbilical vein appearance (H&E, Bar: 100 µm). c) Amnion epithelium surrounding the umbilical cord and Wharton gelly. (Masson trichrome, Bar: 50 µm). d) Single-row cubic amnion epithelium in the umbilical cord. (H&E, Bar: 20 µm). L: Lumen, TIA: Tunica intima, TM: Tunica media, WJ: Wharton gelly, Arrow: Vascular endothelium, Arrow head: Amniotic epithelium

3.1.2 Histopathological results of the gestational diabetes group umbilical cord

Excessive thickening and collapse of the lumen were observed in the umbilical artery wall due to increased collagen (fig. 2a).At tunica media were observed vacuolization and disruption of muscle fibers, while the endothelium showed bulging into lumen and damage (figure-2b). Normally, the circumference of the umbilical vein was observed in the smooth muscle cell line (Figure-2c). Another structural change in the umbilical cord sections of the GD group was metaplasia in the amniotic epithelium (Figure 2d).

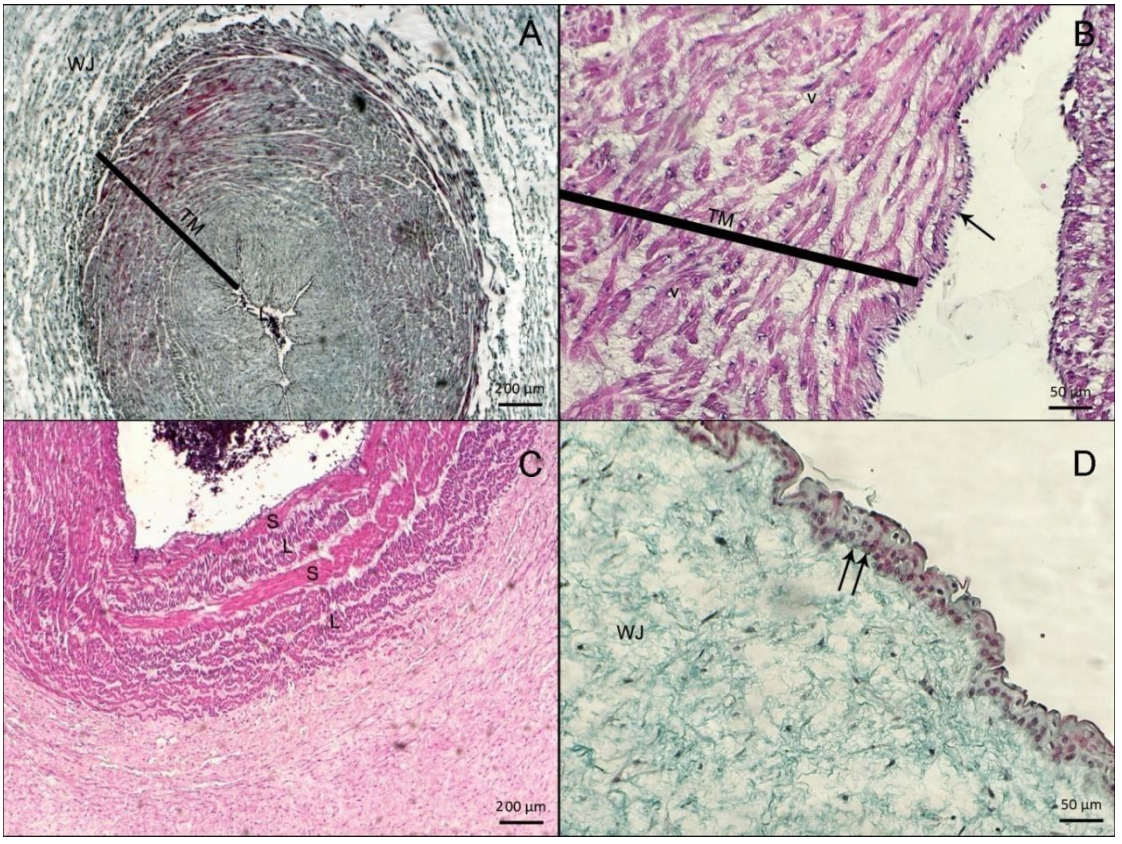

Figure 2. Umbilical cord sections of gestational diabetes group. a: Umbilical cord excessive thickening of the umbilical artery wall (Masson trichrome, Bar: 20 µm). b: Columnar shape in endothelial cell nuclei of umbilical vein, vacuolization and dissociation in tunica medial muscle cells (H-E, Bar: 50 µm). c: Disorganization status in umbilical vein muscle array. (H&E, Bar: 200 µm). d: Metaplasia in the umbilical cord amnion epithelium (Masson trichrome, Bar: 50 µm). L: Lumen, TM: Tunica media, WJ: Wharton gelly, Arrow: Vascular endothelium, V: vacuolization, S: Circular muscle alignment, Double arrow: Metaplasia, WJ: Wharton gelly.

3.1.3 Histopathological results of the umbilical cord in the preeclampsia group

The most significant changes in preeclamptic pregnancies, endothelial injury, and asymmetric thickening due to collagen fiber increase in the media layer of the umbilical artery (Figure 3A).

In some umblical cord sections, umbilical artery media layer showed a snake-like appearance in smooth muscle cell nuclei due to edema, dissociation and contraction (Figure 3B). In the endothelial basal lamina, fragmantation, swelling and undulant laminar changes were observed in all

umbilical cord veins (Figure 3C). A significant thickening was observed on the amniotic basal lamina (Figure-3D).

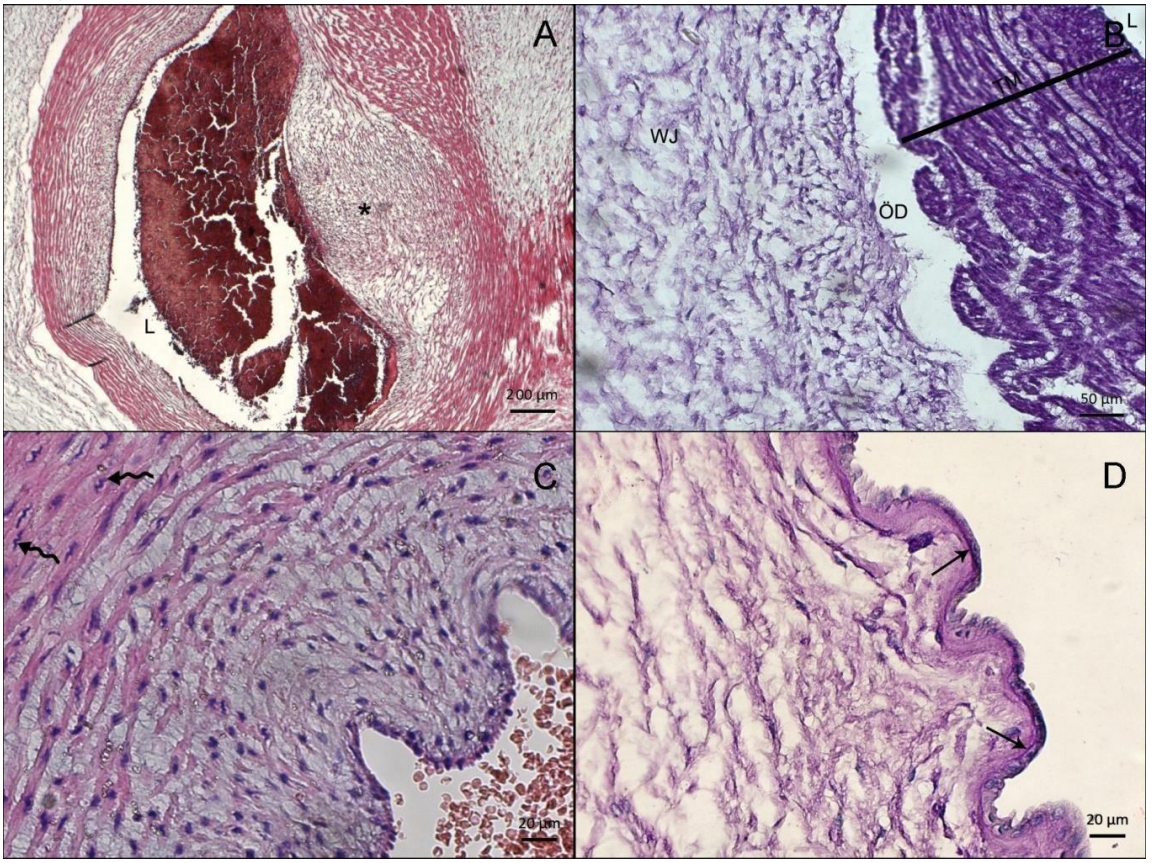

Figure 3. Preeclamptic umbilical cord sections. A: Asymmetric thickening of umbilical artery wall, (Masson trichrome, Bar: 200 µm). B: Muscular disorganization and perivascular edema in the umbilical artery wall, (PAS, Bar: 50 µm). C: Destruction of the umbilical artery endothelium and a snake-like in the muscle cell nuclei, (H&E, Bar: 20 µm). D: Thickening of amniotic basal lamina, (PAS, Bar: 20 µm). Asterix: Asymetric thickening, TM: Tunica media, L: Lumen, ÖD: Perivascular edema, Curved arrow: Muscle cell nuclei ,Thick arrow: Amniotic basal lamina.

3.1.4. Histopathological results of HELLP group umbilical cord.

Due to diffuse edema and collagen fiber increase in muscle fibers, excessive thickening and luminal narrowing in the umbilical artery wall was very prominent (Figure 4A). In most of the cases, Wharton gelly dehiscence, metaplastic changes in amniotic epithelium and obvious thickening of the basal lamina were detected (Figure 4B). Another striking finding was intramuscular and perivascular hemorrhage in the umbilical artery wall, which was not seen in preeclampsia and GD groups (Figure-4C). While endothelial nuclei of the umbilical vessels were prismatic and bulging towards the lumen, in all cases basal lamina was seen to fragment, swelling and ondulations (Figure 4D).

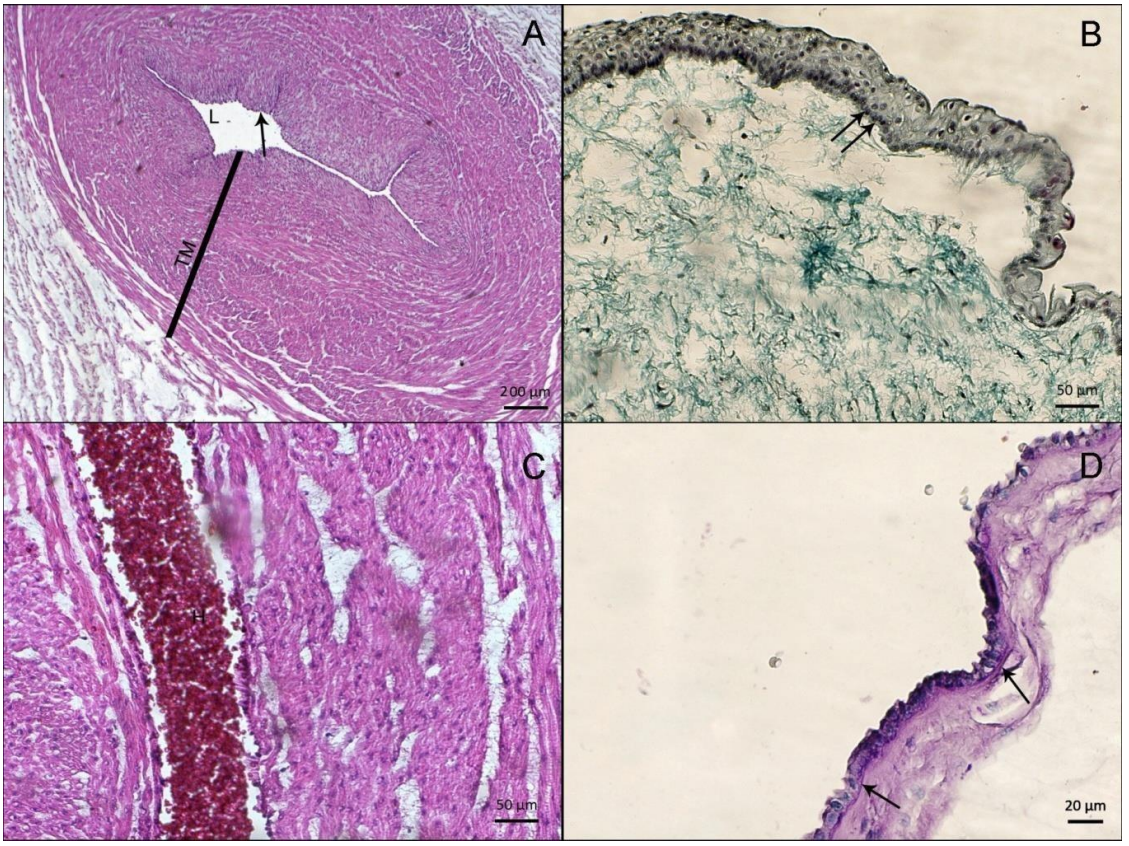

Figure 4. HELLP group umbilical cord sections. A: Advanced thickening of the umbilical artery wall (H&E, Bar: 200 µ m), B: metaplasia in amniotic epithelium (Masson trichrome, Bar: 50 µ m), C: Hemorrhage in the umbilical artery tunica media (H-E, Bar: 50 µ m), D: Thickening of amniotic epithelium basal lamina (PAS, Bar: 20 µ m). L: Lumen, Arrow: Endothelium, TM: Tunica media, H: Hemorrhage, Thick arrow: Amniotic basal lamina.

3.2. Umbilical cord statistical analysis

The measurement data of the umbilical vessels are shown in table-1 and the significance status is shown in Table 2. As a result of the measurements, it was observed that there was narrowing of umbilical artery and artery lumen diameter in all three groups according to the control group (Figure 1). A significant thickening of the HELLP, GD and preeclampsia groups was observed in the umbilical artery media (Figure 6).

In the evaluation of umbilical cord vein lumen diameter, it was concluded that only the GD group had dilatation and this measurement was significant (Figure-7). There was a significant thickening ($p=0.000$) in the GD group compared to the control group but the HELLP and preeclampsia groups were similar to the control group (Figure 8).

An increase in the perimeter length was found in the GD group compared to the control in the total circumference measurement of the umbilical cord (Figure 9).

There was a significant increase in the umbilical cord diameter in the GD group compared to the control group (Figure 10).

Table 1: Morphological measurement data of umbilical cord diameter, circumference and umbilical vein.

	Groups		Mean	Standard deviation	Standard error	Minimum	Maximum
Artery lumen diameter mean. (µm)	Control		668,5429	41,60216	15,72414	604,20	722,60
	Hellp		329,8857	64,54449	24,39552	243,20	418,60
	Preeclampsia		292,8286	71,41017	26,99051	197,80	380,90
	GD		325,1000	56,82693	21,47856	227,50	393,50
Artery media thickness mean. (µm)	Control		330,4571	35,28290	13,33568	277,90	374,80
	Hellp		476,4571	35,19990	13,30431	434,60	518,70
	Preeclampsia		472,8857	44,10493	16,67010	412,00	529,40
	GD		734,7286	72,15060	27,27036	627,30	853,50
Vein lumen diameter mean. (µm)	Control		1030,0429	118,76648	44,88951	884,00	1239,50
	Hellp		995,5714	282,84704	106,90613	630,20	1306,50
	Preeclampsia		814,4000	433,45071	163,82897	150,60	1583,00
	GD		1582,6571	247,92722	93,70768	1156,50	1882,00
Vein media thickness mean. (µm)	Control		363,5757	62,32031	23,55486	307,80	482,92
	Hellp		359,1114	113,46184	42,88455	208,54	479,70
	Preeclampsia		299,7800	76,61616	28,95819	210,12	412,16
	GD		610,8200	77,83889	29,42033	500,62	742,38
Total circumference length. (cm)	Control		3,0571	44293	16741	2,50	3,90
	Hellp		2,6571	,17182	,06494	2,40	2,90
	Preeclampsia		2,8000	,48305	,18257	2,30	3,80
	GD		4,0943	,12998	,04913	3,90	4,30
Total diameter length. (mm)	Control		73,0000	6,02771	2,27826	67,00	85,00
	Hellp		67,2857	9,01322	3,40668	57,00	82,00
	Preeclampsia		78,2857	11,49948	4,34640	62,00	95,00
	GD		110,2857	3,03942	1,14879	107,00	116,00

Table 2. Multicenter multiple comparison chart of umbilical cord diameter, circumference and umbilical vein.

	Intergroup pairwise comparisons		P
Artery Lumen F=61,713 p=0,000	Control	Hellp	0,000
	Control	Preeclampsia	0,000
	Control	GD	0,000
	Hellp	Preeclampsia	Ns
	Hellp	GD	Ns
	Preeclampsia	GD	Ns
Artery Media F=82,416 p=0,000	Control	Hellp	0,000
	Control	Preeclampsia	0,000

	Control	GD	0,000
	HELL	Preeclampsia	Ns
	HELL	GD	0,000
	Preeclampsia	GD	0,000
Vein Lumen F=8,973 p=0,000	Control	HELL	Ns
	Control	Preeclampsia	Ns
	Control	GD	0,005
	HELL	Preeclampsia	Ns
	HELL	GD	0,005
	Preeclampsia	GD	0,000
Vein Media F=18,614 p=0,000	Control	HELL	Ns
	Control	Preeclampsia	Ns
	Control	GDM	0,000
	HELL	Preeclampsia	Ns
	HELL	GD	0,000
	Preeclampsia	GD	0,000
Total circumferenc e F=24,8 20 p=0,000	Control	HELL	Ns
	Control	Preeclampsia	Ns
	Control	GD	0,000
	HELL	Preeclampsia	Ns
	HELL	GD	0,000
	Preeclampsia	GD	0,000
Total diameter F=40,036 p=0,000	Control	HELL	Ns
	Control	Preeclampsia	Ns
	Control	GD	0,000
	HELL p	Preeclampsia	Ns
	HELL	GD	0,000
	Preeclampsia	GD	0,000

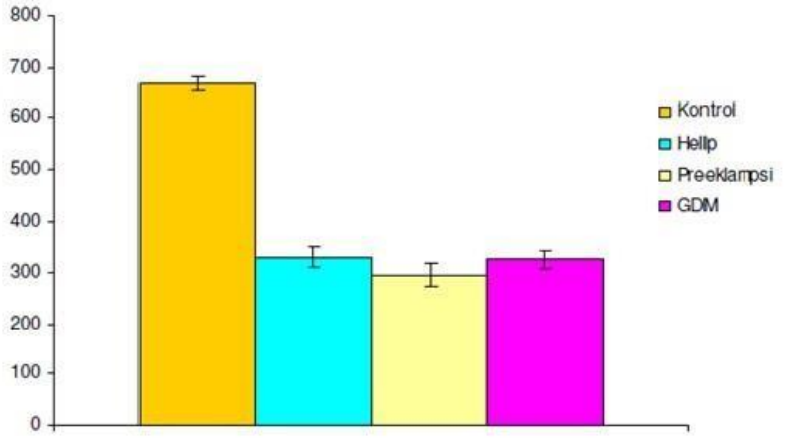

Figure 5: Mean diameter of umbilical artery lumen

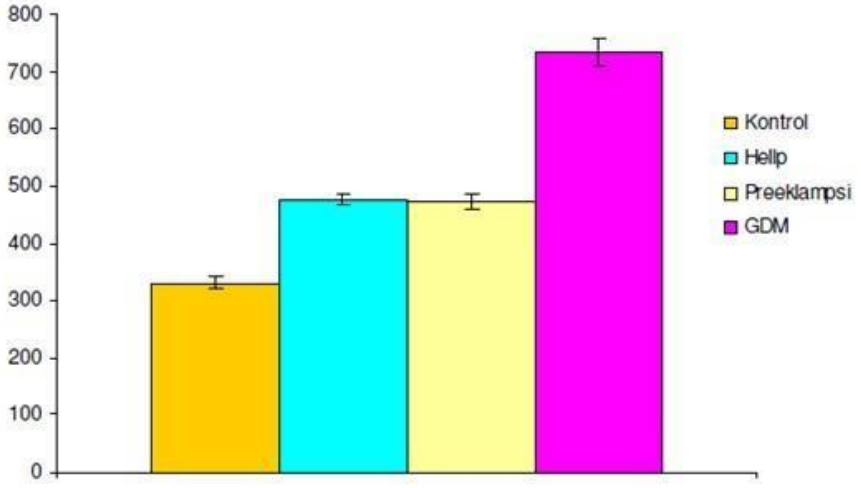

Figure 6. Mean thickness of the umbilical artery tunica media layer

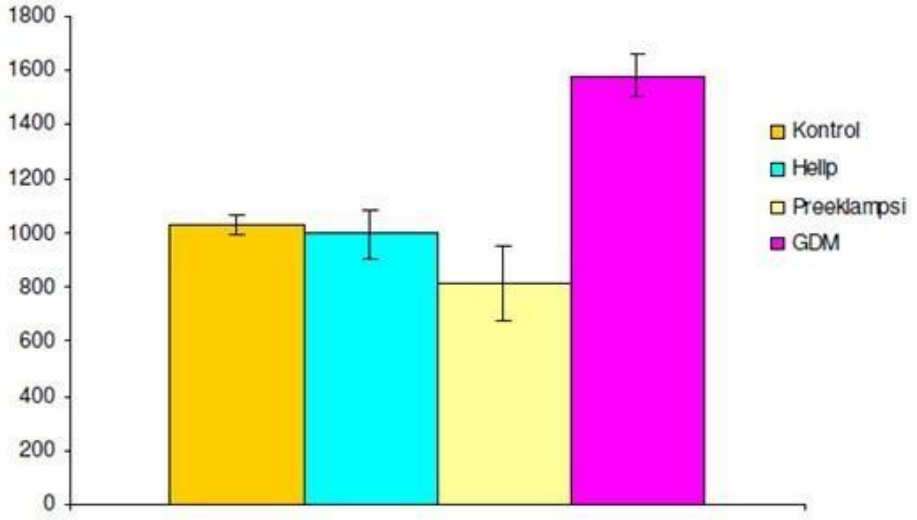

Figure 7. Mean diameter of umbilical vein lumen

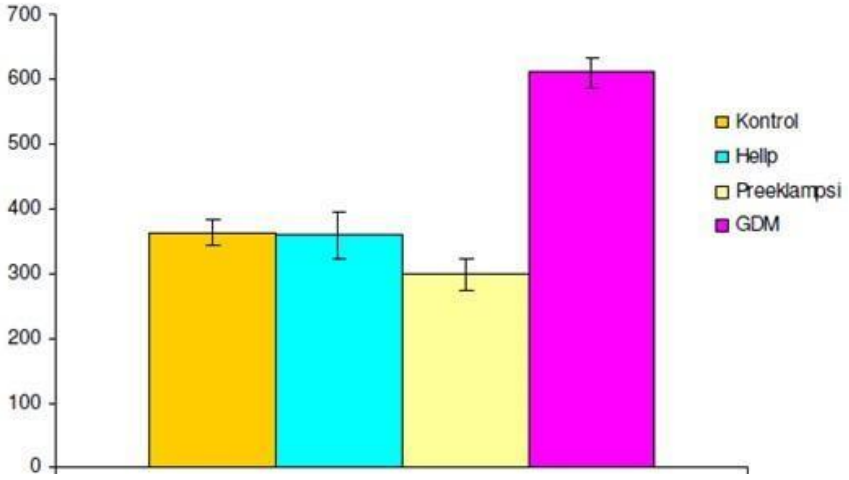

Figure 8. Mean thickness of umbilical vein tunica media layer

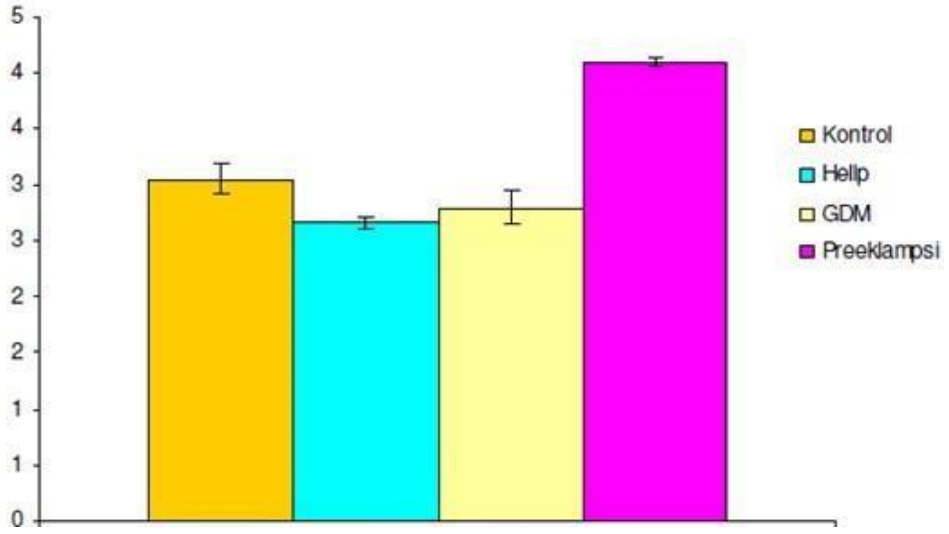

Figure 9. Total circumference of umbilical cord according to the groups

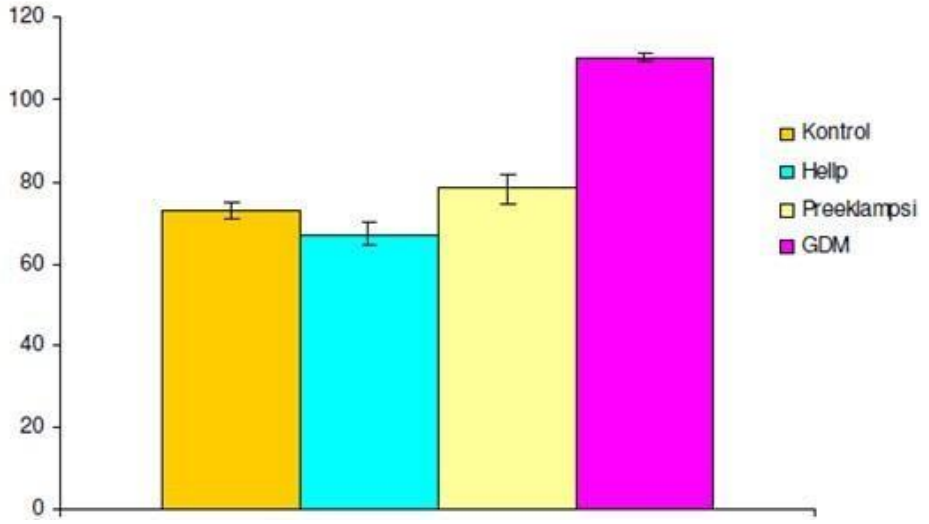

Figure 10. Total diameter of the umbilical cord according to the groups

4. Discussion

In this study, histopathological and morphometric changes in the umbilical cord of patients with gestational diabetes, preeclampsia and HELLP syndrome were examined.

In our study, when we compared the control group, we found that Wharton gelly was more in the GD group and it had many samples. This is in line with the findings of Weissman et al. [6]. Although 2 arteries were found in all the umbilical cord groups (% 100) and control group (% 94) in our study groups; 1 patient in the control group and 1 artery in 2 arteries (6%). Similar phenomena were recorded in Nadkarni as 4%. Excess umbilical vein is very rare [7-8].

Excess vein structure is generally reported as a vein in publications. Excess vein is the right vein structure that does not undergo atrophy. This structure is the remnant of vitelline veins when the excess vein is in the arterial structure [9-10]. In our case, more veins were more rarely seen in the arterial structure.

Stoker et al. [11] noted that preeclamptic arteries were 15% thicker than normal pregnancies, but Junek [12] reported this rate as 20%. Our study found this rate to be 50%. This thickness is the result of both the tunica intima and the expansion of the tunica media.

Weissman and Jakobi [6] emphasized that the umbilical cord was thicker in diameter due to the increase in Wharton gelly in GD cases in comparison with the umbilical cord in cases with gestational diabetes. In our study, we found similar results in both GD and HELLP cases

The thickening of the artery intima is due to the accumulation of smooth muscle cells, collagen increase and glycosaminoglycans in the vessel wall. These findings are correlated by the study of Bertrand [13].

It is known that the mother and placenta vascular system affect the intrauterine development of fetus. Preeclampsia is an important pathological syndrome related to pregnancy and affects both the fetus and the mother's vascular system [14].

In a pressure increase in the lumen of the umbilical arteries, the arterial wall is stretched, an increase in tactical structures, and consequently a little thickening in the artery wall compensates itself [14].

In our study, we found similar findings in umbilical arteries. On the other hand, the compensatory state of the umbilical vein is limited in the pressure increase, so that lumina are dilated and the wall was thinner [15].

In our study, although almost all sections of the umbilical cord obtained from cases with preeclampsia, GD and HELLP syndrome had increased endothelial damage and collagen fiber increase in umbilical artery media layer, intramuscular hemorrhage in the media layer of umbilical artery was considered as an interesting finding in patients with HELLP syndrome (Figure-4).

As known, amniotic epithelium surrounding the umbilical cord was simple cubic layer in normal pregnancies, while metaplasia and basal laminar changes (rupture, swelling, ondulation) were observed in GD and preeclamptic cases. However, we would like to emphasize the advanced metaplasia and basal lamina thickening in the amniotic epithelium of the umbilical cord of our cases with HELLP.

Inan et al. [16] emphasized the decrease in wall thickness in umbilical vessels in patients with pre-eclampsia with doppler. These morphological changes were not found to be due to irregularity of blood flow or decreased blood flow. In our study, the vascular wall thickness of the preeclampsia

umbilical cord was found to be considerably thicker than normal. These results are in contrast to the work of Inan and his friends.

In our study, arterial wall thickness was found more striking than normal in gestational diabetes and HELLP cases. We believe that intense collagen fiber increase observed in umbilical artery wall of our cases with gestational diabetes, preeclamptic and HELLP syndrome will decrease the umbilical blood flow by decreasing the lumina and will have a negative effect on the development of fetus.

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PREVALENCE AND CORRELATES OF CONDOM ERRORS AMONG SEXUALLY ACTIVE RESIDENTS OF GEM SUB-COUNTY, SIAYA, COUNTY WESTERN KENYA, 2012-2014

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Abstract: *Condom effectiveness is compromised by user errors. We set out to examine the rates of condom use and condom errors among sexually active persons living within a Health Demographic Surveillance this high HIV prevalence area in Western Kenya. We analyzed data from the second round of a longitudinal bio-behavioral survey that was conducted in Gem, Siaya County between November 2012 and February 2014.Logistic regression analysis was done to identify predictors of condom use among all sexually active persons and condom errors among participants reporting condom use in the past 3 months. Of 7815 persons interviewed minority (39%) reported having used male condoms with at least one sexual partner in the past 3 months of whom 459 (15%) reported condom errors. Majority of those reporting condom errors had experienced 'incomplete use' (i.e. (a combination of early removal, late application or both early removal and late application). Participants who had experienced condom errors were significantly more likely to be aged <25 years and 25-34 years compared to those who were aged 35 years and older (OR 1.5; 95% CI 1.1-1.9 and OR 1.3; 95% CI 1.0-1.8 respectively to have had 3 or more and 2 sexual partners in the past 12 months compared to those who had one (OR 2.4; 95CI 1.7-3.5 and OR 1.6;95%CI 1.2-2.1 respectively),to have reported their sex partners to have ever been drunk during sex (OR 1.7; 95% CI 1.1-2.7), to have used mind altering substances in the past 12 months compared to those who had never used mind altering substances in the past 12 months (OR 1.9; 95% CI 1.2-3.1), and to report that their sex partner had ever used mind altering substances in the past 12 months (OR 1.7; 95% CI 1.0-2.8). Limited experience with condom use and the use mind-altering substances may partly be responsible for condom errors. Sexual and reproductive health programs should provide health education to promote condom use and HIV risk awareness. Additional strategies to mitigate effects of drug abuse as a harm reduction strategy should be considered for HIV prevention.*

Key words: *condom errors, condom use,*

1. Background

According to the Kenya AIDS indicator Survey of 2012, Siaya County of Western Kenya is one of the five counties with the highest HIV prevalence in Kenya; 17.8% against the country's

average of 5.6% [1].The Kenya AIDS Indicator Survey of 2012 illustrated that, 19% of sexually active persons reported condom use in the past three months with 20% reporting at least one instance of condom errors with majority being condom slippage [2].

The male latex condom is the single most efficient available technology to reduce sexual transmission of HIV and other sexually transmitted infections [3]. The Kenyan government advocates for condom use for HIV prevention [4]. However, condom effectiveness is compromised by user errors that include lack of use and incorrect use [5].

With health programs focusing on condom distribution, uptake and frequency of use, condom use errors are overlooked [5, 6]. Consequently, this has substantial implications for HIV and STI prevention [5]. Additionally, national surveys are sporadic and may not be representative of the general population [7]. Furthermore, majority of studies have focused on men attending STI clinics, MSM, FSW, PLHIV or women [3, 8-10]. We set out to examine the rate of condom use and condom errors among persons that had been sexually active within the past three months who lived within KEMRI/CDC Health Demographic Surveillance Area which is a high HIV prevalence area in Western Kenya with a view to informing HIV prevention programs.

2. Methods

2.1 Study design and setting

Two rounds of cross-sectional surveys evaluating HIV risk behaviors, HIV sero-status factors and HIV prevention interventions, have been conducted in Gem, Siaya County between March 2011 to September 2012 and January 2013 to February 2014 respectively. We chose to analyzed data from the more recent second round of the survey which represents the most recent data. Kenya Medical Research Institute (KEMRI)/US Centers for Disease Control and Prevention (CDC) Health and Demographic Surveillance System Area (KEMRI/CDC HDSS) provided a sampling frame from which a random sample of 4, 000 compounds were selected through a community-based simple random approach. Detailed description of the HDSS has been described by Odhiambo et al [11].

2.2 Study population

Our study population of interest included all persons aged ≥ 13 years, who had had sex in the three months preceding the interview date, were found within the selected compounds and had spent the previous night in the said household. Persons were interviewed prior to survey HIV testing by HIV Testing and Counseling counselors certified by the National AIDS Control Council in Kenya of the same gender prior to survey testing [4]. Interview topics included participant demographics, sexual behavior, and utilization of HIV health services.

2.3 Definitions of 'variables of interest'

Participants were described as 'currently married' if they reported to be in a relationship, cohabiting or married in a monogamous or polygamous relationship and 'previously married' if they reported being divorced or widowed. Participants were described has having attained 'primary level' education if they had either complete or incomplete primary level education, as having 'secondary level' education if they had either complete or incomplete secondary level education, or 'tertiary level' education if they were in or had completed tertiary level training.

Participants were described as having used drugs in the past year if they answered in the affirmative to the question *'have you used any mind altering substances e.g. bhang, miraa, in the past 12 months'*.

2.4 Definitions of 'outcomes of interest'

Participants were described as ever having used a condom if they answered yes to the question *'have you ever used a condom when having sex with partner x'*. Condom errors three months preceding the interview, were described either as 'late application' if the participant answered yes to the question *'while using condoms with partner x, did you ever put on the condom after you had already started having sexual intercourse'* and 'early removal' if the participant answered yes to the question *'while using condoms with partner x, did you ever take off the condom before you were finished having sexual intercourse'* and 'condom slippage' if the participant answered yes to the question '*while using condoms with partner x, did the condom you were using ever slip off during sex or while pulling out*' and 'condom breakage if the participant answered yes to the question '*while using condoms with partner x, did the condom you were using ever break or leak during sex or while pulling out?* . 'Incomplete condom use', was described as a combination of 'early removal' and 'late application' [5]. A participant was described as ever having experienced a condom error if he or she reported experiencing any of the condom errors described above.

2.5 Data analysis

Chi square statistics were used to describe participant characteristics by history of condom use in the past 3 months among all participants and by history of experiencing a condom error in the past three months and all participants who reported having ever used a condom in the past 3 months.

We fitted logistic regression to identify predictors of condom use among all sexually active persons and condom errors among participants reporting condom use in the past 3 months. All variables with p-value$\leq$ 0.1 in the univariate were included in the multivariate mode. All estimates were reported at 95% confidence interval.

2.6 Ethical considerations

Ethical approval to conduct this study was granted by the Kenya Medical Research Institute Ethics Review Committee (SSC. 1801).

3. Results

3.1 Participant selection

A total of 14116 persons were interviewed during the survey. Of these, 7815 met the criteria for inclusion in our analysis (Figure 1).

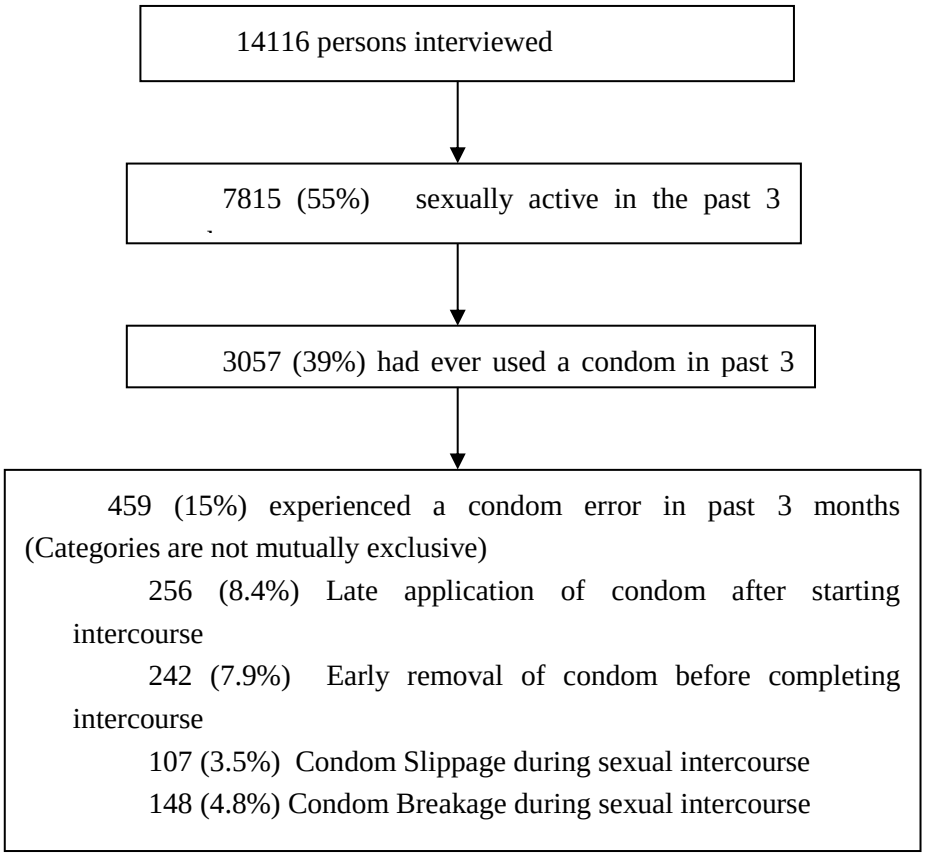

Figure 1. Participant selection

Majority were, aged≥ 35 years (45%), female (58%), currently married (78%), had attained primary level education (73%), engaged in some form of employment (82%), and had had one sex partner in the past 12 months (90%). The majority had never taken alcohol before sex (95%) or been drunk during sex (97%) or used mind-altering substances in the past one year (97%). Nearly all reported that their partners had never taken alcohol before sex (96%), nor had been drunk during sex (96%) or had used mind-altering substances in the past one year (97%) (Table 1)

Table 1. Characteristics of participants who had ever used a condom in the past 3 months during sexual intercourse, Gem, Siaya County, 2012-2014

Characteristic	**Total N=7815 N (%)**	**Used condom in past 3 months 3057 (39%) N (%)**	**Did not use condom in past 3 months N (%)**	**P value**
Age group				
<25 years	1992 (25)	1256 (63)	736 (37)	<0.01
25-34 years	2331 (30)	1001 (43)	1330 (57)	
35+ years	3492 (45)	800 (23)	2692 (77)	
Gender				
Male	3287 (42)	1500 (46)	1787 (54)	<0.01
Female	4528 (58)	1557 (34)	2971 (66)	
Marital status				

Single	1270 (16)	981 (77)	289 (23)	<0.01
Currently married	6074 (78)	1854 (31)	4220 (69)	
Previously married	451 (6)	211 (47)	240 (53)	
Education				
None	398 (5)	50 (13)	348 (87)	<0.01
Primary	5678 (73)	2057 (36)	3621 (64)	
Secondary	1499 (19)	800 (53)	699 (47)	
Tertiary	240 (3)	150 (63)	90 (37)	
Occupation				
Employed	6339 (82)	2208 (35)	4161 (65)	<0.01
Unemployed	1405 (18)	809 (58)	596 (42)	
12 months sex partners				
1	7035 (90)	2555 (36)	4480 (64)	<0.01
2	574 (7)	349 (61)	225 (39)	
3+	206 (3)	153 (74)	53 (26)	
Ever taken alcohol before sex				
Yes	421 (5)	209 (50)	212 (50)	<0.01
No	7394 (95)	2848 (39)	4546 (61)	
Ever been drunk during sex				
Yes	207 (3)	96 (46)	111 (54)	0.03
No	7608 (97)	2961 (39)	4647 (61)	
Partner took alcohol before last sex				
Yes	505 (6)	180 (36)	325 (64)	0.09
No	7310 (94)	2877 (39)	4433 (61)	
Partner was drunk during sex				
Yes	314 (4)	113 (36)	201 (64)	0.25
No	7501 (96)	2944 (39)	4557 (61)	
Ever used mind altering substances in past 12 months				
Yes	229 (3)	106 (46)	123 (54)	0.02
No	7586 (97)	2951 (39)	4635 (61)	
Partner ever used mind altering substances past 12 months				
Yes	260 (3)	93 (36)	167 (64)	0.26
No	7555 (97)	2964 (39)	4591 (61)	

3.2 Condom use

Less than a half of the participants (n=3057; 39%) reported having used condoms with at least one sexual partner in the 3 months preceding the interview date (Figure 1). Data not shown indicates that majority (99%) used the male condom.

In the univariate analyses persons who used mind-altering substances were significantly more likely to be aged < 25 years, male, single, of secondary or tertiary level education, unemployed, had more than 3 sex partners in the 12 months preceding the interview, had ever taken alcohol before sex, reported being drunk before sex and having used mind altering substances in the 12 months preceding the interview (Table 1).

In the multivariate analyses, persons who had used condoms were more likely to; be aged <25 years and 25-34 years compared to those who were aged 35 years and older (OR =3.5; 95% CI 3.0-4.1 and OR =2.4; 95% CI 2.1-2.7 respectively), be male (OR=1.3; 95% CI 1.1-1.4), be single and previously married compared to those who were currently married (OR 3.2; 95% 2.7-3.8 and OR 2.4; 95% CI 1.9-2.9 respectively), be of primary, secondary or tertiary level education compared to those who had 'no education' (2.3 95% CI 1.7-3.1, OR 3.7; 95%CI 2.6-5.1, and 5.4; 95% CI 3.5-8.3 respectively), to have had 3 or more and 2 sexual partners in the 12 months preceding the interview date, compared to those who had one (OR 3.1; 95CI 2.2-4.5 and OR 2.0;95%CI 1.7-2.5 respectively), to have ever taken alcohol before sex compared to those who had never taken alcohol before sex (OR 1.7; 95% CI 1.3-2.4)and to have never been drunk during sex in the 3 months preceding the interview date compared to those who had ever been drunk during the same time period (OR 1.6; 95% CI 1.0-2.5) (Table 2).

Table 2. Factors associated with condom use among sexually active participants, Gem, Siaya County, 2012-2014

Characteristic	**Crude Odds Ratio (COR) (95% CI)**	**P value**	**Adjusted Odds Ratio (AOR) (95% CI)**	**P value**
Age group				
<25 years	5.7 (5.1-6.5)	<0.01	3.5 (3.0-4.1)	<0.01
25-34 years	2.5 (2.3-2.8)		2.4 (2.1-2.7)	
35+ years	Ref		Ref	
Gender				
Male	1.6 (1.5-1.8)	<0.01	1.3 (1.1-1.4)	<0.01
Female	Ref		Ref	
Marital status				
Single	7.7 (6.7-8.9)	<0.01	3.2 (2.7-3.8)	<0.01
Currently married	Ref		Ref	
Previously married	2.0 (1.7-2.4)		2.4 (1.9-2.9)	
Education				
None	Ref	<0.01	Ref	<0.01
Primary	3.9 (2.9-5.3)		2.3 (1.7-3.1)	
Secondary	7.9 (5.8-10.9)		3.7 (2.6-5.1)	
Tertiary	11.6 (7.8-17.2)		5.4 (3.5-8.3)	
12 months sex partners				
1	Ref	<0.01	Ref	<0.01
2	2.7 (2.3-3.2)		2.0 (1.7-2.5)	
3+	5.1 (3.7-6.9)		3.1 (2.2-4.5)	
Ever taken alcohol before sex				
Yes	1.6 (1.3-1.9)	<0.01	1.7 (1.3-2.4)	<0.01
No	Ref		Ref	
Ever been drunk during sex				
Yes	Ref		Ref	
No	1.4 (1.1-1.7)	0.03	1.6 (1.0-2.5)	0.03

3.3 Condom errors

Only 459(15%) among those who reported having used condoms with at least one sexual partner in the past 3 months reported a condom error. The condom errors experienced were late application (8.4%), early removal (7.9%), Condom breakage (4.8%) and condom slippage (3.5%); participants may have experienced more than one error therefore, these categories are not mutually exclusive (Figure 1). Data not shown indicates that the majority of respondents had experienced 'incomplete use' (i.e. (a combination of early removal, late application or both early removal and late application) (55%), condom breakage (15%), slippage (8%), a combination of all four errors (5%) amongst other errors.

In the univariate analyses, participants who experienced condom errors were more likely to be, aged less than 25 years, to have had 3 sex partners in the 12 months preceding the interview date, either they themselves or their sex partners had ever taken alcohol before sex, or been drunk during sex or used mind altering substances (Table 3).

Table 3. Characteristics of participants who had ever experienced condom errors past 3 among those who used condoms in the past 3months, Gem, Siaya County, 2012-2014

Characteristic	**Total who used condoms in the past 3 months 3057**	**Experienced condom in the past 3 months 459 (15%)**	**Did not Experienced condom in the past 3 months**	**P value**
Age group				
<25 years	1256 (41)	207 (17)	1049 (83)	<0.01
25-34 years	1001 (33)	158 (16)	843 (84)	
35+ years	800 (26)	94 (12)	706 (88)	
Gender				
Male	1500 (49)	245 (16)	1255 (84)	0.05
Female	1557 (51)	214 (14)	1343 (86)	
Marital status				
Single	981 (32)	170 (17)	811 (83)	0.05
Currently married	1854 (61)	259 (14)	1595 (86)	
Previously married	211 (7)	29 (14)	182 (86)	
Education				
None	50 (2)	3 (6)	47 (94)	0.11
Primary	2057 (67)	327 (16)	1730 (84)	
Secondary	800 (26)	109 (14)	691 (86)	
Tertiary	150 (5)	20 (13)	130 (87)	
Occupation				
Employed	2208 (73)	335 (15)	1873 (85)	0.56
Unemployed	809 (27)	116 (14)	693 (86)	
12 months sex partners				
1	2555 (84)	342 (13)	2213 (87)	<0.01
2	349 (11)	71 (20)	278 (80)	
3+	153 (5)	46 (30)	107 (70)	
Ever taken alcohol before sex				
Yes	209 (7)	48 (23)	161 (77)	<0.01

No	2848 (93)	411 (14)	2437 (86)	
Ever been drunk during sex				
Yes	96 (3)	26 (27)	70 (73)	<0.01
No	2961 (97)	433 (15)	2528 (85)	
Partner took alcohol before last sex				
Yes	180 (6)	41 (23)	139 (77)	<0.01
No	2877 (94)	418 (15)	2459 (85)	
Partner was drunk during sex				
Yes	113 (4)	30 (27)	83 (73)	<0.01
No	2944 (96)	429 (15)	2515 (85)	
Ever used mind altering substances in the past 12 months				
Yes	106 (3)	33 (31)	73 (69)	<0.01
No	2951 (97)	426 (14)	2525 (86)	
Partner ever used mind altering substances in the past 12 months				
Yes	93 (3)	26 (28)	67 (72)	<0.01
No	2964 (97)	433 (15)	2531 (85)	

In the multivariate analyses, participants who had experienced condom errors were more likely to be aged <25 years and 25-34 years compared to those who were 35 years and older (OR 1.5; 95% CI 1.1-1.9 and OR 1.3; 95% CI 1.0-1.8 respectively); to have had 3 or more and 2 sexual partners in the past 12 months compared to those who had one (OR 2.4; 95CI 1.7-3.5 and OR 1.6;95%CI 1.2-2.1 respectively) and, to have reported their sex partners to have ever been drunk during sex compared to those who did not (OR 1.7; 95% CI 1.1-2.7). In the 12 months preceding the interview date, they were more likely to have used mind altering substances compared to those who had not (OR 1.9; 95% CI 1.2-3.1), and to report that their sex partner had ever used mind altering substances compared to those who did not give such a report (OR 1.7; 95% CI 1.0-2.8) (Table 4).

Table 4. Factors associated with condom errors among sexually active participants who had ever used condoms in the past 3 months, Gem, Siaya County, 2012-2014

Characteristic	**Crude Odds Ratio (COR) (95% CI)**	**P value**	**Adjusted Odds Ratio (AOR) (95% CI)**	**P value**
Age group				
<25 years	1.5 (1.1-1.9)	<0.01	1.5 (1.1-1.9)	0.02
25-34 years	1.4 (1.1-1.9)		1.3 (1.0-1.8)	
35+ years	Ref		Ref	
12 months sex partners				
1	Ref	<0.01	Ref	<0.01
2	1.7 (1.2-2.2)		1.6 (1.2-2.1)	
3+	2.8 (1.9-4.0)		2.4 (1.7-3.5)	
Partner was drunk during sex				
Yes	2.0 (1.4-3.3)	<0.01	1.7 (1.1-2.7)	0.03
No	Ref		Ref	

Used mind altering substances in past 12 months				
Yes	2.5 (1.7-5.0)	<0.01	1.9 (1.2-3.1)	<0.01
No	Ref		Ref	
Partner used mind altering substances in past 12 months				
Yes	2.5 (1.4-3.3)	<0.01	1.7 (1.0-2.8)	0.04
No	Ref		Ref	

4. Discussion

Our evaluation revealed that less than half of sexually active young single educated male participants that were not in stable partnerships and had multiple sex partners had used condoms in the past three months. Among them, 15% reported condom errors. These were young men with multiple sex partners who either consumed drugs by themselves, or their partners' consumed drugs, or were inebriated during intercourse. The fact that our evaluation revealed higher condom use rates and lower condom errors rates than in the nation- wide Kenya AIDS Indicator survey in this high HIV prevalence area, illustrates the on-going HIV prevention efforts in this region [1].

Older persons who did not use condoms may have perceived themselves to be at a lower risk for HIV as shown from unpublished data from a HBCT survey in the same population. Similarly, persons in stable partnerships (i.e. those who were described as being in a relationship or cohabiting or married), may have felt that condom use in such partnerships is associated with infidelity and mistrust. This is supported by reports of FSW, who are a high-risk HIV group, who said that they did not consistently use condoms with their regular partners since "regular partners should not use condoms" [8, 12].This is supported by the fact that persons with multiple sex partners in our evaluation were more likely to use condoms. The fact that more men than women reported a history of condom use may indicate challenges with negotiating condom use by women within sexual relationships[9]. A higher education level among persons who use condoms may be related being more knowledgeable about condom that has been associated with enhanced condom use [3, 8].

It is encouraging that younger persons, who shoulder the disproportionate burden of new HIV infections in Kenya, are using condoms [13]. This should nevertheless be interpreted with caution since just as condom distribution rates do not necessarily reflect condom use rates, individual reports of condom use may be biased. However, younger persons were also more likely to report condom errors. This may be due to their inexperience with condom use [14]. With the age of sexual debut decreasing among young persons, this may partially explain the increased incidence of HIV among this population (1). In the literature, persons with multiple sex partners were more likely to report condom errors (10).This may be related to the probability of engaging in risky sexual behavior [15]. With the condom errors being reported by persons with multiple sex partners, this population is at risk of STI including HIV [16]. However, since we did not quantify the number of condom errors among our participants, we could not relate this to more frequent use of condoms.

Incomplete condom use was the most common condom error reported. This may be attributed to alcohol consumption by the participant or his/her sexual partner, or the use of mind alerting substances which have been shown to hamper HIV prevention efforts by impairing judgment [3]. Incomplete application has also been attributed to rushed condom application which may be more common among young persons who have unplanned sexual liaisons [17, 18]. Persons who reported having removed a condom prior to completion of sexual intercourse may have had challenges with the fit of the condom or erectile difficulties. On the other hand, persons who reported condom application after starting sexual intercourse had low motivation to use condoms [15, 19]. An early onset of sexual debut, multiple sex partners, lower rates of condom use among females, a high rate of condom errors and use of alcohol and other drugs of abuse vividly illustrate the intersectional risks for HIV among young persons. This may be responsible for the recent increase in HIV burden among the youth [20].

Our evaluation was not without limitations. We did not quantify the number of condom errors and therefore could not compute condom error rate. Additionally, our results may have been affected by recall bias and validity of self-report. We did not quantify the amount of alcohol consumed by participants and this may partially explain the unusual relationship between alcohol consumption prior to sexual activity and condom use. Our analysis did not include the relationship between either intimate partner violence or engaging in anal sex and condom use. This is because the data that was collected was related to IPV or anal sex in the past year which may not have been related to sexual relationships within the three months preceding the interview. We however included the use of mind altering substances in the past year because it was likely to impact on sexual relationships within the past year.

In conclusion, young single men with limited experience with condom use who consume alcohol and other drugs of abuse were more likely to report condom errors; majority of whom reported incomplete use of condoms. We therefore recommend that health education, especially for young persons, be conducted to promote condom use [3, 8, 14], and dispel myths associated with reduced sexual pleasure [8] and to promoting HIV risk awareness among older persons in stable partnerships [21]. Such education should also be directed to techniques of reducing condom error, e.g. allowing ample time for condom application [12] and the use of condoms from beginning to end of penetrative intercourse to reduce the risks of STIs, HPV and pregnancy [19]. Such education should also be directed addressing causes of erectile difficulties and the involvement of female partners whose involvement has been shown to reduce condom errors [22]. Additionally, HIV prevention programs, family planning and STI clinics should avail condoms of different sizes and brands for users to finds the right fit to address challenges with incomplete use of condoms [19] Furthermore, additional strategies for HIV prevention e.g. Pre-Exposure Prophylaxis [23], and microbicides [24] for women may be considered where condom use is at the sole discretion of the male partner and to mitigate effects of drug abuse as a harm reduction strategy [25].

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HISTOLOGICAL AND HISTOCHEMICAL EVALUATION OF NORMOTENSIVE AND PREECLAMPTIC PLACENTAS

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Abstract: *The placenta plays a role in the pathophysiology of preeclampsia. Preeclampsia is more common in multifetal pregnancies than singleton pregnancies. In this study, we aimed to investigate the histopathology of normotensive and preeclamptic placentas and the localization of alkaline phosphatase activity. In our study, 10 normotensive and 10 preeclamptic, totally 20 placentas were obtained.Paraffin sections were stained with Hematoxylin-Eosin, Masson trichrome and PAS for histopathological examination. Remaining sections were then stained via Gomori's method and micrographed under light microscope. Sections of the control group observed normal histologically structure. The alkaline phosphatase reaction was evident in the inner and outer membranes of the syncytiotrophoblasts. There was a significant increase in the number of syncytial knots, terminal villi and syncytial bridges in the preeclamptic placenta sections. Marked thickening of the trophoblast basal membranes were observed. Alkaline phosphatase reaction in preeclampsia group: The localization of alkaline phosphatase in the inner and outer membranes of the syncytiotrophoblasts was reduced. In placentas of preeclampsia group, a significant increase in syncytial knot, syncytial bridge were observed. The level of alkaline phosphatase enzyme in preeclamptic placentas was found to be lower compared to normotensive placenta.*

Key words: *Placenta, Preeclampsia, Alkaline phosphatase, Light microscope.*

1. Introduction

The placenta plays a role in the pathophysiology of preeclampsia. Preeclampsia is more common in multifetal pregnancies than singleton pregnancies [1]. In the preeclampsia although its starting point is not known, reduced placental perfusion and the destruction of the placental tissue which leads to maternal vascular endothelium dysfunction are said to be responsible mechanism of preeclampsia [2].

Normally, the alkaline phosphatase enzyme (PALP) is produced from the basal membrane of the microvilli on syncytiotrophoblasts and their surfaces. This enzyme is produced in small amounts

during the first and second trimester, increases in the third trimester and reaches the maximum amount in the full-term placenta [3].

This enzyme is responsible for the active transport of phosphate [4], the transfer of maternal IgG to the fetus [5-6], the absorption of nutrients [7] and the growth and development of the fetus. The placenta synthesizes PALP in the second and third trimester of pregnancy and the PALP concentration slowly increases till the term. Reduced serum PALP level in pregnant women may be related to intrauterine growth retardation [8-9].

In this study, we aimed to investigate the histopathology of normotensive and preeclamptic placentas and the localization of alkaline phosphatase activity

2. Material and Methods

In our study, 10 normotensive and 10 preeclamptic, totally 20 placentas were obtained. 1x1x1 cm^3 tissues were dissected and fixed in 10% neutral formalin. 4 µm paraffin sections were stained with Hematoxylin-Eosin (H&E), Masson trichrome and periodic acid Schiff (PAS) for histopathological examination. Remaining sections were taken to positive-charged slides and incubated at room temperature for 1 hour. Sections were then stained via Gomori's method and micrographed taken under light microscope.

3. Results

3.1. Control group results

3.1.1. H&E and PAS staining results of control group

Syncytiotrophoblast layer, villus stroma, fetal vascular structures, intervillous space and Hofbauer cells and trophoblast basal membranes were histologically observed normal structure in placenta sections of the control group (Figure 1).

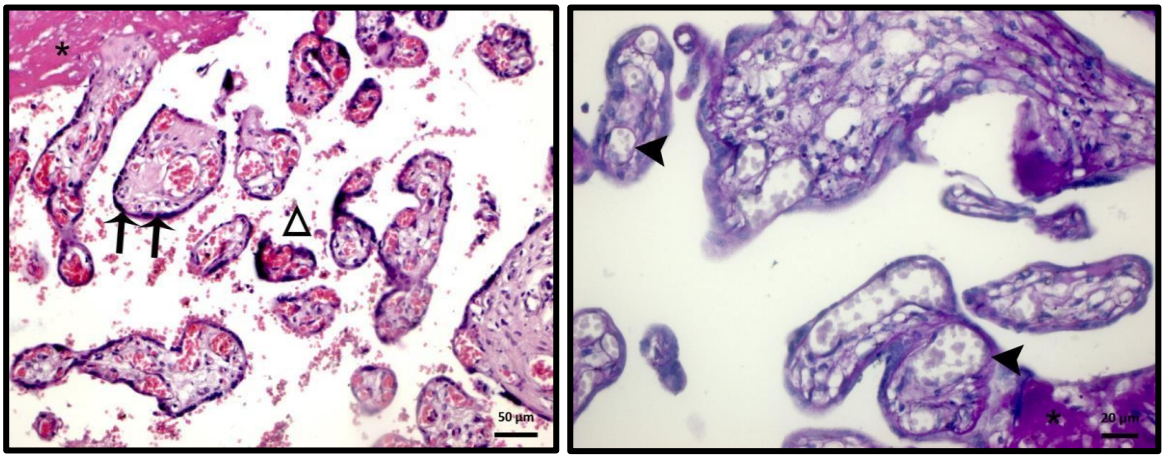

Figure 1: Placental sections of the control group. **a)** Syncytiotrophoblast cells (double arrow), perivillous fibrin accumulation (asterisk) and intervillous space (empty triangle) are seen (H.E, Bar:50 µm). **b)** Trophoblastic basement membranes in normal thickness (arrowhead) and perivillous fibrin accumulation (asterisk), (PAS, Bar: 20 µm).

3.1.2. Control group alkaline phosphatase reaction

Alkaline phosphatase reaction was strongly observed in sections obtained from full-term placentas without a history of preeclampsia or any pregnancy complications. When we examined the

placenta sections of the control group with a large magnification, the alkaline phosphatase reaction was evident in the inner and outer membranes of the syncytiotrophoblasts. While the reaction was continuously monitored on the outer membrane, it was non-continuous on the inner membrane.
On the other hand, villous stroma and maternal decidua showed a moderate alkaline phosphatase reaction. While the alkaline phosphatase reaction was negative in cytotrophoblasts, alkaline phosphatase reaction was found to be poor in villous stroma and maternal decidua of full-term preeclamptic placentas (Figure 2).

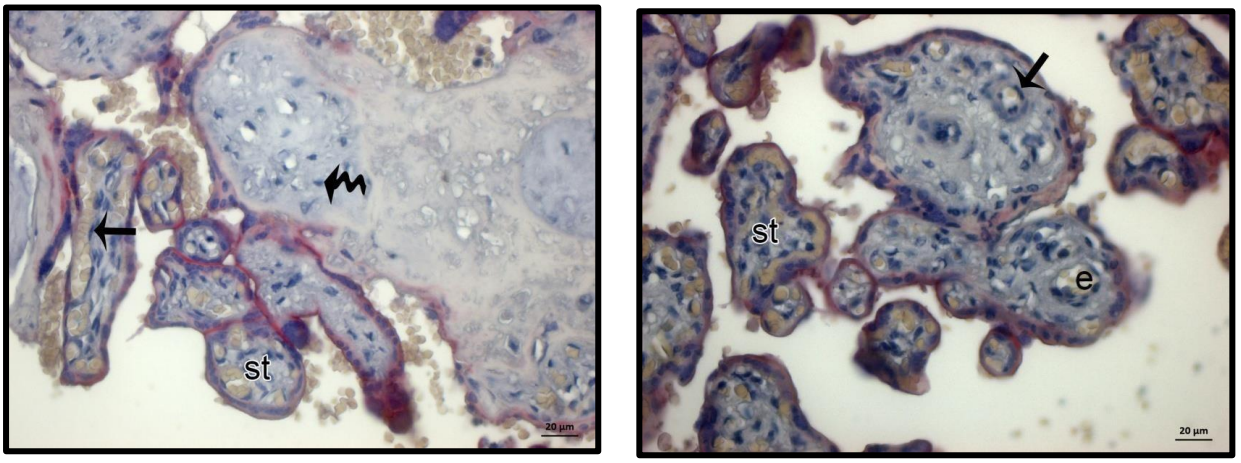

Figure 2: Placental sections of the control group. **a)** Negative alkaline phosphatase enzymatic reaction in villus stroma (st), capillary endothelium (thin arrow) and decidua cells (convoluted arrow) but positive reaction in syncytiotrophoblasts (ALP, Bar: 20 µm). **b)** Negative alkaline phosphatase enzymatic reaction and fetal erythrocytes (e) are observed in placental villus stroma (st) and capillary endothelium (thin arrow) (ALP, Bar: 20 µm).

3.2. Placenta results in preeclampsia group

3.2.1. H&E and PAS staining results of preeclampsia

There was a significant increase in the number of syncytial knots, terminal villus and syncytial bridges in the placenta sections.

In addition, dilatation, proliferation and congestion were seen in the capillaries of fetal terminal villi. A labyrinth-like appearance was observed in preeclamptic placenta sections due to syncytial knots and bridges between villi Marked thickening of the vasculosyncytial and trophoblast basal membranes were observed as well as a dense fibrinoid increase in the perivillous and intervillous area (Figure 3).

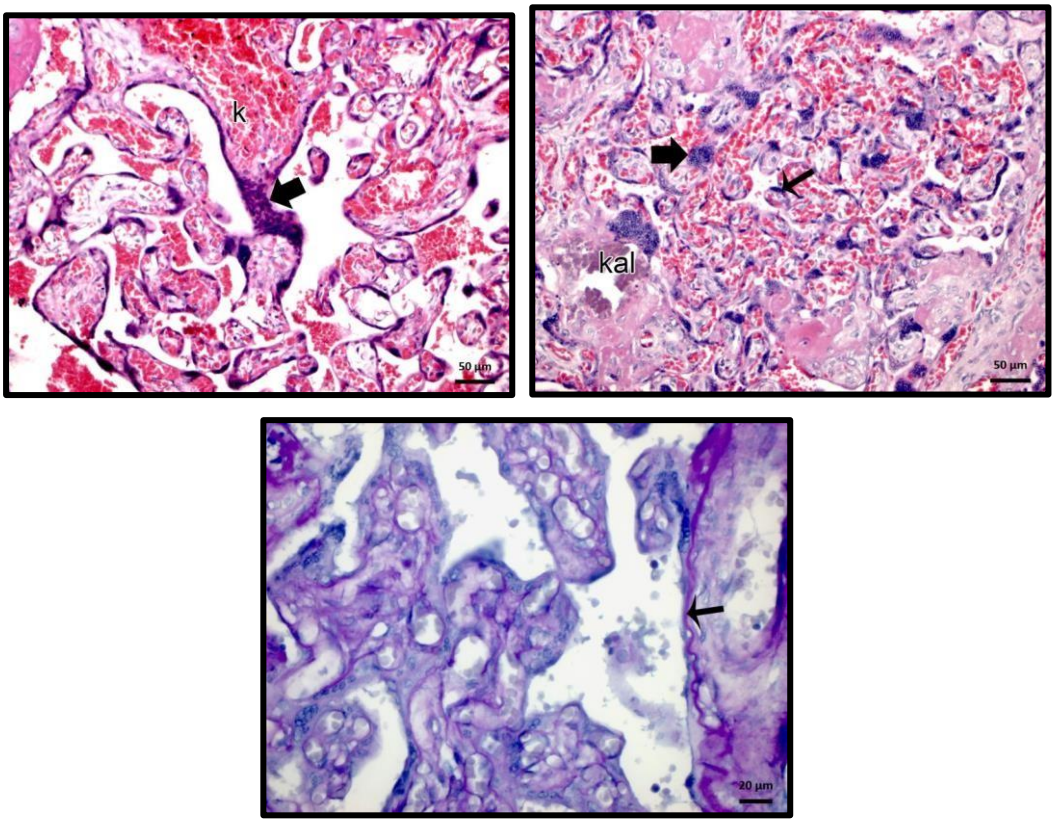

Figure-3: Placenta sections of the preeclampsia group. **a)** Dilatation in the fetal capillaries (k) intense increase in syncytial knots and syncytial bridges (thick arrow), (H.E, Bar: 50 µm). **b)** Focal calcification focus (kal) with intense syncytial bridges (thick arrow) and syncytial knots (thin arrow) (H.E, Bar:50 µm). **c)** Thickening and fibrinoid accumulation in vasculosyncytial membranes (arrowhead) (PAS, Bar:20 µm).

3.2.2. Alkaline phosphatase reaction in preeclampsia group

In the examination of placenta sections of preeclampsia patients; The localization of alkaline phosphatase in the inner and outer membranes of the syncytiotrophoblasts was reduced.

In different villi, even in some of the cells in the same villi, presence of both weak and strong enzymatic activity leads to a heterogeneous general appearance in placenta (Figure 4).

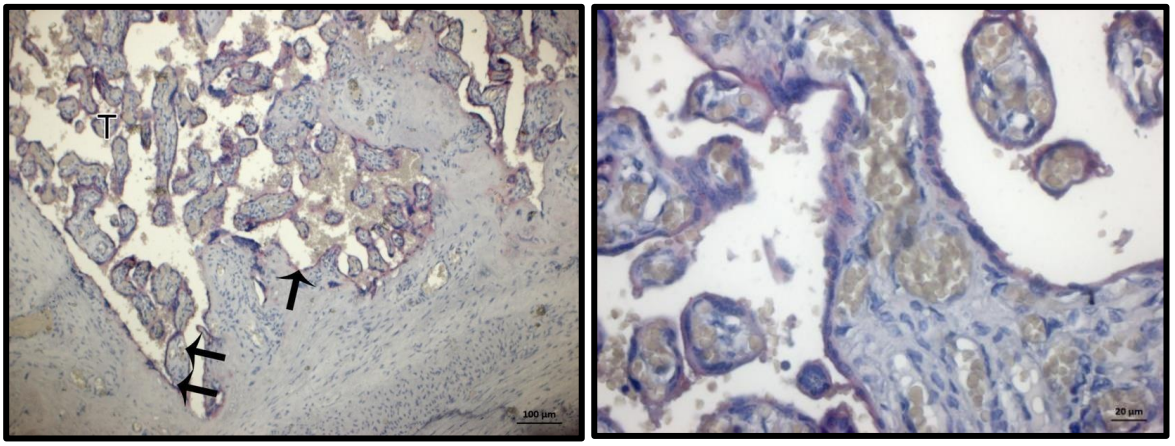

Figure-4: Placenta sections of preeclampsia group. a) Alkaline phosphatase reaction in placenta basal plate, cytotrophoblastic shell (thin arrow), anchoring villi (double arrow) and terminal villi (t) was observed at lower density than control sections (ALP, Bar: 100 µm). b) Higher magnification of the placenta section (ALP, Bar: 20 µm).

4. Discussion

As stated in the results, control sections of placenta showed a positive alkaline phosphatase reaction in all villi, especially in syncytiotrophoblast cells. In the literature, alkaline phosphatase activity was observed in Hofbauer cells, but only one study stated the reaction was very different [9]. In our study, we did not observe such finding. Although our results of enzyme placement were consistent with the findings of some researchers [5-8]; it is not supported by some other articles. Wielenga et al [9] observed negative enzymatic results in the nuclei of vascular and syncytial cells. This result may depend on the incubation time of the tissue and the methods applied.

Our findings regarding the distribution of the enzyme alkaline phosphatase in full-term placentas obtained from pregnant women during the control group period without a history of preeclampsia or other maternal complications were similar to those reported by other workers [10]. Alkaline phosphatase is an important enzyme for trophoblastic transfer, so it is very abundant in the full-term placenta [11]. Placental alkaline phosphatase (PALP) has been the subject of many studies because it plays an important role in the transport mechanism. We observed that the PALP was localized in the outer and inner layers of the syncytiotrophoblasts, and villi stroma of placentas of the control group (normotensive) were negatively stained. Some researchers found that PALP residues of control group placentas continued uninterruptedly on the brush edge of the outer membrane of the syncytiotrophoblasts, however they were noncontinuous in the inner membrane. Fetal stroma, blood vessels and cytotrophoblast showed negative staining. Our study confirms the reported observations of PALP in the placenta. In our study, PALP activity was found to be more intense in the control placenta than in the preeclamptic placenta. This finding is in contrast to the studies of Mangal et al., Jeacock et al., Curzen P and Dempsey et al [12-15]. The very strong PALP activity found in most of the villi of control placenta was seen on the basal membrane, the apical surface and cytoplasm of syncytiotrophoblast microvilli. This finding was in contrast to Mangal et al [16] and Curzen P et al [14] findings, which is strong PALP activity in the preeclamptic placenta compared to control placenta.

Dempsey et al. [15] reported that the preeclamptic placenta had PALP activity in the connective tissue stroma, but we did not find any such findings in our study.

In our study of histological examination of the control group placentas; villus trophoblast layer, villus stroma, fetal vascular structures were seen in normal appearance, while there was an increase in fetal volume, fetal capillary count, fibrinoid accumulation, Hofbauer cells and atrophic villi in preeclamptic placentas (Figure-3-4). These findings in preeclamptic placentas are consistent with other studies investigating placental histopathology in preeclampsia [17-20].

In placentas of preeclampsia group, a significant increase in syncytial knot, syncytial bridges, atrophic villus and perivillous fibrin accumulation and a significant thickening of the trophoblast basal membrane were observed. The level of alkaline phosphatase enzyme in preeclamptic placentas were found to be lower compared to normotensive placenta.

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